CHAPTER 5

CUMULATIVE IMPACTS

CHAPTER 5
CUMULATIVE EFFECTS

Cumulative effects are those impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such action (40 Code of Federal Regulations [CFR] 1508.7). The analysis is performed for each resource within areas called Cumulative Effects Areas (CEAs). The CEAs are described in the subsections below and vary by resource. For the purposes of analysis in this Draft Environmental Impact Statement (Draft EIS), reasonably foreseeable future actions were identified as those activities which are approved and those activities that have been submitted but are not yet underway. These activities include mining or exploration applications submitted but not yet agency approved, and activities for which exploration and planning is underway and an approximate area of disturbance has been identified. These criteria were not based on a time range. The primary source of information was the mining plan and application information from the Bureau of Land Management (BLM) and U.S. Forest Service (USFS).

Cumulative effects can result from individually minor, but collectively major, actions taken over a period of time. Major past and present land uses in the area, which are also projected to continue into the future, include roads or trails, timber harvesting, wildfires, livestock grazing, agriculture, and mining. Dispersed recreation (including hunting and fishing) and residential development also occur in parts of the CEAs.

The configuration of the Proposed Action and Rasmussen Collaborative Alternative (RCA), as well as public scoping input gathered for this Draft EIS, provided the foundation for identifying the CEAs. Cumulative effects are evaluated in terms of the specific resource, ecosystem, and human community being impacted; therefore, the boundaries of the CEAs vary by resource. An attempt was made for each environmental resource to determine the extent to which the environmental effect could be reasonably detected, and then include the geographic areas of resources that would be impacted by the environmental effect. However, for simplicity, ease of cumulative impact analysis, and in an attempt to avoid having only slightly different CEAs for some resources, the CEA boundaries were identical for those resources where it seemed reasonable and conservative to do so. The CEA boundaries are sized to prevent dilution of the cumulative effects over large areas. Guidance from the Council on Environmental Quality (CEQ), *Considering Cumulative Effects – January 1997*, was used in identifying geographic boundaries and, ultimately, the CEA for each resource. The CEA for each environmental resource is described below in the specific resource subsections. Figures for the various CEAs are also included.

5.1 GEOLOGY, MINERALS, AND PALEONTOLOGY

5.1.1 CEA Boundary

The CEA for geology, minerals, topography, and paleontology, shown on **Figure 5.1-1** occupies an area of 799 square miles (511,360 acres). This includes the majority of the Southeast Idaho Phosphate District, including known phosphate leasing areas (KPLAs), in Bear Lake, Bonneville, and Caribou Counties, Idaho. Within this CEA, there are 43,644 acres of current federal phosphate leases, approximately 8.6 percent of the total CEA area. The CEA does not

encompass the inactive Gay Mine, which is located in portions of Bingham, Bannock, and Caribou Counties, because of its geographic and hydrologic remoteness from the other mines within the CEA. The Gay Mine is located approximately 20 miles west of the nearest KPLA near the northwest corner of the Southeast Idaho Phosphate District, and in the Snake River watershed. Although the Gay Mine is part of the same mining district as most other mines in the CEA, the others produce ore from a tight cluster of anticlines and synclines in the Blackfoot River or Bear Lake Watersheds. An exception is made for the Smoky Canyon Mine to account for recent and reasonably foreseeable future phosphate mining activities there.

5.1.1.1 Introduction

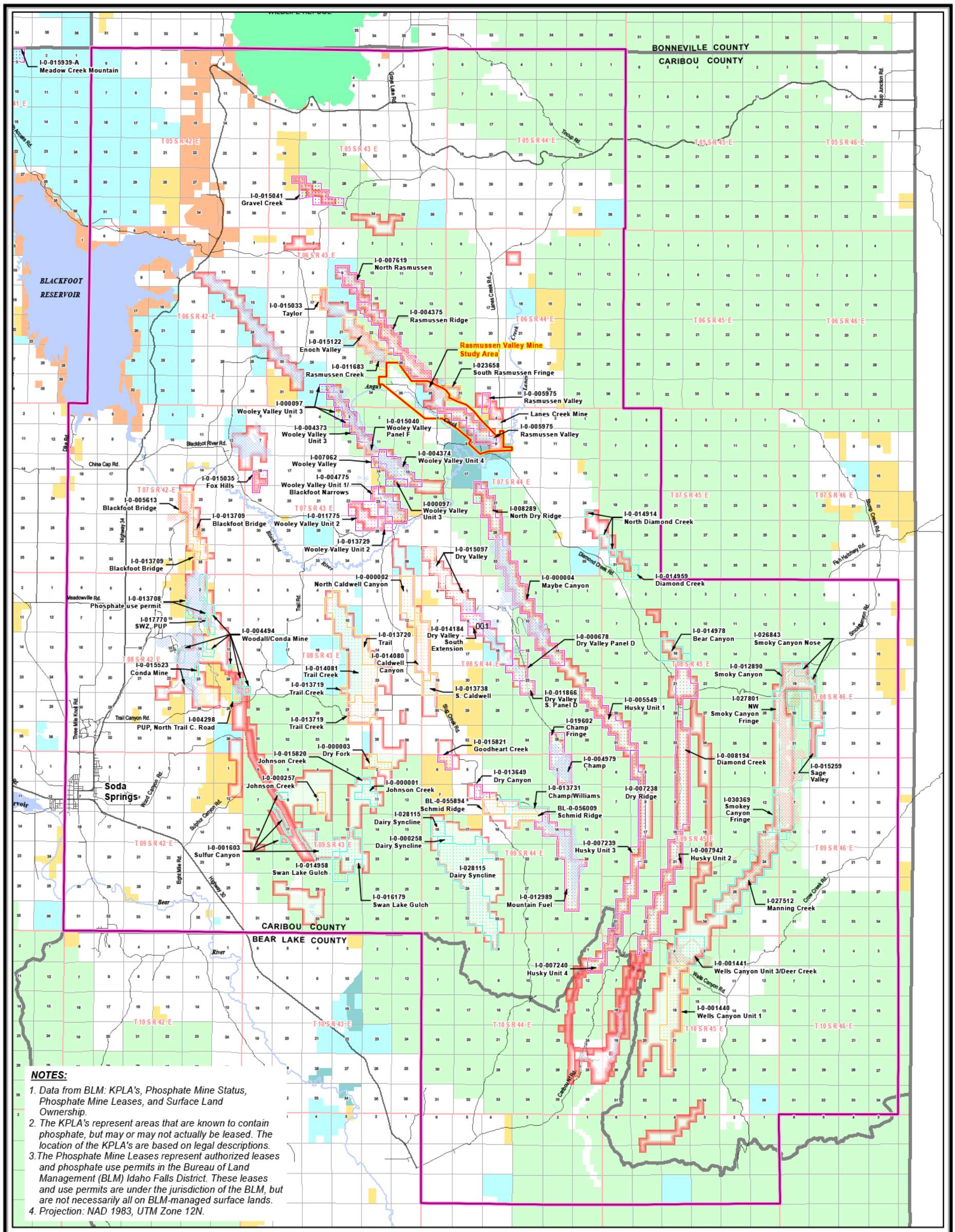
Within the CEA, implementation of the Proposed Action or RCA and other reasonably foreseeable activities would have potential effects related to mineral resource depletion, topographic changes, exposure of seleniferous materials, and other constituents of potential concern (COPCs) to weather processes and subsequent mobilization through seepage; geotechnical instability; and discovery, damage, or removal of paleontological resources. Impacts to these resources from past, present, and reasonably foreseeable future phosphate mining operations are generally confined to specific phosphate mining properties (KPLAs and federal phosphate leases) within the CEA.

Ground-disturbing activities are the primary cause of impacts to paleontological resources. Lesser impacts to currently undiscovered or unrecognized geologic and mineral resources can also result from these activities. Within the CEA, ground-disturbing activities consist of mining processes, and to a lesser extent, construction of transportation infrastructure. Impact types include direct destruction of resources and the loss of contextual geologic and paleontological data. Production of phosphate ore has historically been an important socioeconomic process within the CEA, and is expected to continue to be important in the future. Mining is expected to continue within the CEA until all economically recoverable phosphate has been produced from current and future federal phosphate leases.

Past, present, and reasonably foreseeable actions within the CEA have resulted or would result in both beneficial (e.g., production and understanding of phosphate and other geologic and mineral resources) and adverse (e.g., destruction of fossils) impacts on this resource group. The total (historical and reasonably foreseeable) cumulative disturbance of geologic resources within the CEA as a result of phosphate mining would directly affect about 5.5 percent of the CEA. Because phosphate mining affects higher volumes of rock across larger aerial extents than other activities, the contribution from activities other than phosphate mining to cumulative adverse impacts within the CEA are expected to be minor.

5.1.1.2 Past and Present Activities

The cumulative effects analysis includes all past, present, and reasonably foreseeable future phosphate mining activity in the eastern half of Caribou County and northern Bear Lake County. However, more emphasis is to be placed on mines that commenced operation after 1970 because the data for those mines are more complete and because the earlier mines were often released from lease stipulations for reclamation. A total of 32 phosphate mines have been developed in southeastern Idaho (28 in the CEA) since mining began in the early 20th century. Of these, 12 were small underground mines that are mined out and closed. Surface disturbances from these underground mining operations are typically 1 acre or less. Three former underground mines: Waterloo, Conda, and Maybe Canyon, were converted to surface mining operations, and surface disturbances from these operations are noticeable (Lee 2000).



NOTES:

1. *Data from BLM: KPLA's, Phosphate Mine Status, Phosphate Mine Leases, and Surface Land Ownership.*
2. *The KPLA's represent areas that are known to contain phosphate, but may or may not actually be leased. The location of the KPLA's are based on legal descriptions.*
3. *The Phosphate Mine Leases represent authorized leases and phosphate use permits in the Bureau of Land Management (BLM) Idaho Falls District. These leases and use permits are under the jurisdiction of the BLM, but are not necessarily all on BLM-managed surface lands.*
4. *Projection: NAD 1983, UTM Zone 12N.*

LEGEND

- CUMULATIVE EFFECTS AREA (CEA) FOR GEOLOGY, MINERALS, AND PALEONTOLOGY; AIR; CLIMATE; VISUAL RESOURCES; TRIBAL TREATY RIGHTS AND INTERESTS; AND HAZARDOUS MATERIALS AND SOLID WASTE
- STUDY AREA
- KNOWN PHOSPHATE LEASE AREAS (KPLA'S)

PHOSPHATE MINE STATUS

- ACTIVE
- INACTIVE
- NON-PHOSPHATE (INACTIVE)

PHOSPHATE MINE LEASES (BY LESSEE)

- AGRIUM
- FMC
- FMC; RHODIA INC.
- JR SIMPLOT CO.
- MONSANTO
- RHODIA INC.

SURFACE LAND OWNERSHIP

- INDIAN RESERVATION
- BUREAU OF LAND MANAGEMENT
- NATIONAL WILDLIFE REFUGE
- STATE OF IDAHO: FISH & GAME; PARK & RECREATION
- STATE OF IDAHO: OTHER
- US FOREST SERVICE
- PRIVATE
- ROAD
- MAJOR RIVER

NORTH

0 3 6 Miles

RASMUSSEN VALLEY MINE

FIGURE 5.1-1
Cumulative Effects Area for Geology, Minerals, and Paleontology; Air; Climate; Visual Resources; Tribal Treaty Rights and Interests; and Hazardous Materials and Solid Waste

ANALYSIS AREA: Caribou County, Idaho

Date: 9/4/2015 | Prepared By: JC

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The majority of mines in the region have been open pit operations. Total disturbances at active and inactive mines within the CEA are summarized in **Table 5.1-1**. Although volumes of mined ore and overburden material may be better indicators of disturbances to geologic and paleontological resources, volumetric data may either be non-existent for older mines or proprietary in the cases of current or recently operating mines.

Table 5.1-1 Total Disturbances for Active and Inactive Mines in the Region

Mine	Years of Operation	Disturbed Area (Acres)
Waterloo	1907 to 1920, 1945 to 1960	196
Hot Springs	1907 to 1911, 1954 to 1956	0.5
Paris Canyon	1917 to 1926	<2 (estimate)
Rattlesnake Canyon	1920 to 1926	0.4
Bear Lake	1920 to 1921	0.1
Conda and Trail Canyon	1920 to 1984	1,572
Home Canyon	1916 to 1924	0.8
Consolidated	1920 to 1921, 1930 to 1938	<1 (estimate)
Bennington Canyon	1907 to 1912, 1939 to 1942	2 (estimate)
Wyodak	1942 to 1943	<1 (estimate)
Ballard	1952 to 1969	635
North and South Maybe Canyon	1951 to 1995	1,028
Georgetown Canyon	1958 to 1964	251
Wooley Valley	1955 to 1989	808
Diamond Gulch	1960	32
Fall Creek	1955 to 1964	<1 (estimate)
Mountain Fuel	1966 to 1967, 1985 to 1993	781
Henry	1969 to 1989	1,074
Bloomington Canyon	1972 to 1975	<1
Pritchard Creek	1975 to 1976	2 (estimate)
Lanes Creek	1978 to 1989, 2015 to Present	42
Champ and Champ Extension	1982 to 1985	460
Smoky Canyon	1982 to Present	3,168
Enoch Valley	1990 to Present	645
Rasmussen Ridge Mines[1]	1991 to Present	858
South Rasmussen	2003 to 2015	390
Dry Valley	1992 to 2014	1,082
Blackfoot Bridge	2013 to Present	420
Estimated Total Disturbed Acres		**13,454**

Notes:
1 Includes North Rasmussen Ridge, Central Rasmussen Ridge, and South Rasmussen Ridge Mines
Sources: BLM and USFS 2007; BLM 2014; P4 2015

There are currently five active phosphate mines in the Southeast Idaho Phosphate District: Smoky Canyon (Simplot), Rasmussen Ridge Mines (Agrium), Enoch Valley (P4), Lanes Creek (Agrium), and Blackfoot Bridge (P4). Each of the currently operating mines simultaneously performs mining and reclamation activities in different parts of the mines. The portion of the mined-out areas at previously approved mines that has been reclaimed is unclear, as reclamation varies from mine to mine, and information for older mines is sparse. Mines in operation before 1970 were often released from lease liabilities without stipulations requiring backfilling, regrading, or reseeding disturbed areas (Causey and Moyle 2001).

Within the CEA, additional major earth-moving activities include construction of roads, railways, dams, and aggregate pits. These features exist within the CEA, and primarily impact

topographic resources, with lesser influences on geologic, mineral, and paleontological resources. The impact of aggregate pits on geologic resources is negligible in comparison to phosphate mining.

5.1.1.3 Foreseeable Future Activities

Demand for phosphate fertilizers and phosphorous, coupled with limited supplies of available phosphate rock across the world, is expected to continue into the foreseeable future. Worldwide production is expected to increase by 14 percent from 2013 to 2017 (USGS 2014d). Domestic prices have varied despite increasing demand. Phosphate rock production in the U.S. is expected to remain at approximately 31 million tons per year (USGS 2013). Florida and North Carolina currently produce approximately 85 percent of all phosphate rock in the U.S. Idaho and Utah produce the remainder (USGS 2014d). Average annual production in the CEA is expected to be approximately 3.6 million tons per year, consistent with previous years (USGS 2012).

Reasonably foreseeable disturbances (including the Proposed Action or the RCA) expected from agency approved phosphate mining in the CEA are summarized in **Table 5.1-2**. Of the 17,391 acres of approved or reasonably foreseeable future disturbances and current disturbances at mines within the CEA, 905 acres are scheduled or likely to remain unreclaimed (**Table 5.1-2**). This unreclaimed area represents 5.2 percent of the initial disturbance, and about 2 percent of the KPLAs in the CEA.

Table 5.1-2 Reasonably Foreseeable Disturbance Expected from Phosphate

Mine	Approved Disturbance (acres)	Reasonably Foreseeable Disturbance (Not Yet Approved) (acres)	Future Net Unreclaimed Area[1] (acres)
Smoky Canyon (Including Panels F and G)	3,886	15	91
Blackfoot Bridge	768		65
Enoch Valley	834	--	26
North Rasmussen Ridge	430	--	52
Central Rasmussen Ridge	231	--	0
South Rasmussen Ridge	246	--	0
South Rasmussen	380		
East Smoky Panel	--	847	10
Dairy Syncline	--	1,779	110
Diamond Creek/Freeman Ridge	--	1,200	47
Husky 1/North Dry Ridge	--	1,051	41
Trail Creek	--	1,000	39
Dry Ridge	--	1,000	39
Caldwell Canyon	--	1,200	47
Paris Hills	--	150	6
Total All Mines	**6,775**	**8,242**	**573**

Notes:
1 An average of 3.9 percent of currently agency-approved disturbances are approved to remain unreclaimed. This average was applied to anticipated, but not-yet-approved future disturbances (except Dairy Syncline) to determine reasonably foreseeable unreclaimed areas.
Source: BLM 2015b

5.1.1.4 Cumulative Activities

The total disturbance for the Proposed Action would be 440 acres, 422 acres (96 percent) of which would be reclaimed through reseeding and recontouring to near-original topography. The total disturbance for the RCA would be 400 acres, of which 381 acres (95 percent) would be reclaimed. The total area of long-term disturbance resulting from the Proposed Action (about 17 acres) and from the RCA (about 19 acres) would be less than 0.01 percent of the total area within the CEA. When combined with agency-approved unreclaimed disturbances, existing disturbances at previously approved mines within the CEA, and reasonably foreseeable future disturbance, a total of about 23,000 acres would be disturbed, at least temporarily, including the Proposed Action or the RCA. This represents approximately 37 percent of federal phosphate-leased areas and 4.5 percent of the total area in the CEA.

If all KPLAs within the CEA are developed to the extent that 90 percent of each federal phosphate lease is disturbed through excavation, construction, or other ancillary activities, approximately 39,300 acres (7.7 percent of the CEA) would be disturbed at some point. The volumetric equivalent of geological, mineral, and paleontological resources that would be disturbed is uncertain because each mine would design mine plans according to geologic and market constraints unique to each phosphate lease.

5.1.1.5 Cumulative Effects

The cumulative result of the Proposed Action or the RCA, when combined with known past, present, and foreseeable (approved and not-yet approved) future disturbances in the CEA, would include the long-term surface disturbance of about 23,007 acres. Of this affected area, less than 1 percent of the CEA (640 acres) would remain unreclaimed over the long term as a result of currently agency-approved or reasonably foreseeable disturbances. Estimates of unreclaimed areas from older mines listed in **Table 5.1-1** are unavailable. Cumulative effects to geologic, mineral, and paleontological resources are difficult to determine without estimates of mined volumes of rock within the CEA. However, it is likely that the phosphate resources of the CEA would eventually be depleted.

Because of increasing world-wide demand for phosphate, it is likely that there would be no reduction in current phosphate production levels. As prices increase and readily available resources decrease, phosphate ore that is deeper, lower-grade, and more difficult to process may be targeted for development. Those less economic resources, covered by pit backfill or overburden piles, would be less likely to be developed than if they were not covered.

Geological, mineral, and paleontological resources within the CEA are affected primarily by mining and other construction activities. Negative effects of mining operations can include the destruction and loss of paleontological resources. Positive effects can include discovery of paleontological and mineral resources. Likewise, mining excavations and geological characterization can also provide geologic data, such as local stratigraphy, geologic structure, and geochemistry, that could otherwise not be determined from the surface.

Stability of geologic formations, landforms, and topography is affected by man-made and natural phenomena within the CEA. Pit walls and overburden piles associated with mining operations or road cuts associated with road/highway and railway construction can all contribute to instability. Geotechnical stability typically only affects the local area of disturbance for most construction activities. Unstable overburden piles at the edges of federal phosphate leases may affect other resources outside the lease boundary. For example, overburden pile slope failures at

Conda/Woodall Mountain Mine, Wooley Valley Mine, and North Maybe Canyon Mine have directly impacted surface water quality in Angus Creek and East Mill Creek, respectively (Lee 2000; USFS 2008). Slope failures have also been recognized elsewhere in the CEA, including the Conda/Woodall Mountain Mine (IDEQ and USEPA 2011). Because the individual disturbances within the CEA are small in comparison to the overall size of the CEA, cumulative effects related to geotechnical stability are unlikely. Overall, cumulative effects to geotechnical stability are short-term and negligible.

Cumulative effects resulting from rock excavation and placement on paleontological resources within the CEA are anticipated to be similar for the Proposed Action and RCA because the Meade Peak Member of the Phosphoria Formation is the primary source of phosphate ore in the Southeast Idaho Phosphate District. As a result, paleontological resources within the Meade Peak Member of the Phosphoria Formation have likely been affected by all other phosphate mines in the CEA. Similarly, because of their stratigraphic position proximate to the Phosphoria Formation, impacts to the Dinwoody and Wells Formations have likely been impacted by other phosphate mines within the CEA. As such, impacts to paleontological resources within those geologic units under the Proposed Action or RCA would be additive to other disturbances within the CEA. Overall, cumulative effects to paleontological resources are long-term and minor.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no effects to geology, minerals, and paleontology.

5.2 AIR RESOURCES, CLIMATE, AND NOISE

5.2.1 Air Quality

5.2.1.1 CEA Boundary

The CEA for air resources is the same tight cluster of anticlines and synclines in the upper Blackfoot River and Bear Lake Watersheds defined for Geology, Minerals, and Paleontology (**Figure 5.1-1**). This region is characterized by generally north- to northwest-trending mountains, ridges, and valleys and constitutes a comparatively discrete area for air movement. Cumulative effects to air quality will be assessed from the existing mine operations in the area, which will include the eastern half of Caribou County and a portion of Bear Lake County. It is likely that there would be little or no contribution to cumulative effects to air resources.

5.2.1.2 Introduction

The CEA is within a region of generally north- to northwest-trending mountain ranges and valleys. There are currently five active phosphate mines in the Southeast Idaho Phosphate District: Smoky Canyon, Blackfoot Bridge, Enoch Valley, Lanes Creek, and Rasmussen Ridge Mines. Additionally, the Dry Valley mine is in reclamation phases (BLM 2014). The CEA also encompasses Agrium's and Monsanto's phosphate ore processing plants near Soda Springs.

The Study Area for the proposed Rasmussen Valley Mine is approximately 55 miles (90 km) from the Grand Teton National Park boundary. Grand Teton National Park is classified as a Class I Area. The federal Clean Air Act requires that Class I areas be evaluated for haze and visibility impacts if a new or a major-modification facility is planned within 60 miles (100 km) of a Class I Area.

5.2.1.3 Past and Present Activities

Past and present activities that contribute to impacts in the CEA include the continued operations of phosphate mines, phosphate processing plants, lumber harvesting, grazing, wildfires, controlled burns, and traffic on paved and unpaved roads. The CEA has been and is presently located within an area designated as an attainment area or unclassified for all National Ambient Air Quality Standards (NAAQS). Particulate matter with a nominal diameter of 10 microns or less (PM_{10}) is the most common air pollutant emission associated with phosphate mining, and mining is the major activity that produces fugitive dust in the area. Other past and present sources of impacts include residential and small industrial heating sources such as natural gas, oil, and wood. These sources are primarily located in Soda Springs, the impacts are minimal, and are expected to remain approximately equal to present conditions.

The Rasmussen Ridge Mines are adjacent to the Proposed Action and RCA. Air quality impacts from that mine are the nearest past and present mining operations to the Proposed Action or the RCA. As the operations at Rasmussen Ridge Mines conclude, the equipment from the mine would be transported and used at the proposed Rasmussen Valley Mine. The nearby Lanes Creek Mine will operate during the transition and would overlap with the closing of the Rasmussen Ridge Mines and development of infrastructure at the Proposed Action or RCA.

5.2.1.4 Foreseeable Future Activities

Foreseeable air quality disturbances include the continued operations and development of new phosphate mines, phosphate processing plants, lumber harvesting, grazing, wildfires, controlled burns, traffic on paved and unpaved roads, and residential and industrial heating sources.

The foreseeable air quality impacts from the Proposed Action or the RCA are estimated to be roughly equal to those produced by the Rasmussen Ridge Mines. As noted above, the Rasmussen Ridge Mines are expected to conclude mining operations in 2017, and at that time, the Proposed Action or the RCA would begin. The Proposed Action or the RCA would take the place of the Rasmussen Ridge Mines and would have roughly the same impacts. There would be minimal change to impacts contributing to cumulative impacts.

5.2.1.5 Cumulative Activities

Mining, wildfires, and controlled burns have the greatest potential to affect air quality in the CEA. Additional to the activities described in the past, present, and foreseeable future, natural sources of fugitive dust can develop from wind erosion, especially in arid conditions and areas of sparse vegetation.

Cumulative activities for the Proposed Action or the RCA would be similar and would not pose different impacts to air quality within the CEA or to the closest Class I area (Grand Teton National Park).

5.2.1.6 Cumulative Effects

Wildfire emissions, when added to existing concentrations of air pollutants, could contribute to cumulative effects that result in non-attainment of the particulate standards in specific areas. Controlled burns are conducted in compliance with state regulations for protection of air quality and only when ambient air quality standards would not be exceeded. The Idaho Department of Environmental Quality (IDEQ) provides updated air quality conditions to the public on their air quality monitoring website. Depending on the proximity of fires to the mine, and the prevailing

wind direction, emissions from the fires could add to those from the mining operations. Smoke disperses rapidly in most cases, and effects to air quality are limited to the duration of the fires. It is not possible to quantify these effects in this CEA as a result of the uncertainty of these conditions; therefore, it is not meaningful to determine the cumulative effects of adding the particulate emissions from the Proposed Action or RCA to potential smoke emissions from fires. The Proposed Action or RCA would comply with the existing NAAQS and applicable state and federal regulations for air quality.

Impacts to air quality from the Proposed Action or the RCA may result from wind erosion and fuel-burning equipment at the mine or facilities, including generators, and vehicle emissions. These impacts, along with ongoing impacts from wildfires and controlled burns, contribute to the cumulative effects of past, present, and reasonably foreseeable future activities. The Study Area is in attainment for all NAAQS criteria pollutants and has relatively good air quality, and the Proposed Action or the RCA would meet ambient air quality standards.

Cumulative effects resulting from the Proposed Action or the RCA would not impact air resources differently within the CEA. The intensity of effects from Agrium would shift operations from the Rasmussen Ridge Mines to the Proposed Action or the RCA and continue operations throughout the life of proposed mining activities. The addition of the Proposed Action or RCA to the increased cumulative effects on air quality would be short-term and negligible.

5.2.2 Climate and Climate Change

5.2.2.1 CEA Boundary

The Proposed Action or the RCA and other phosphate mining activities can be viewed within the same CEA as Geology, Minerals, and Paleontology (**Figure 5.1-1**), and is also based on the regional atmospheric system. The CEA is the Southeast Idaho Phosphate District, which includes the eastern half of Caribou County and a portion of Bear Lake County.

5.2.2.2 Introduction

The CEA is within a region of generally north- to northwest-trending mountain ranges and valleys. It is expected that the Rasmussen Ridge Mines operations would phase out and the Proposed Action or the RCA would begin shortly thereafter. Carbon dioxide (CO_2) is the primary greenhouse gas (GHG) contributing to recent climate change. Through animals and plant respiration, volcanic eruptions, and ocean-atmospheric exchange, CO_2 is naturally forming. Human activities (such as burning of fossil fuels) contribute CO_2 to the atmosphere, which cumulatively increases the total generated CO_2 emissions with the naturally forming CO_2 from the carbon cycle activities (USEPA 2015b). GHG emissions from the Proposed Action or the RCA would be roughly similar to those at the currently operating Rasmussen Ridge Mines and, therefore, would not constitute an additional contribution to cumulative impacts.

5.2.2.3 Past and Present Activities

The past and present activities generating GHG emissions are directly related to phosphate mining operations, public traffic through and to recreational locations within the CEA, operation of agricultural equipment, residential and small industrial heating sources, and other commercial and industrial activities. Quantitative data on these varied sources are not readily available; their contribution is small compared to phosphate mining and processing, and they are expected to remain approximately equal to present conditions.

5.2.2.4 Foreseeable Future Activities

Foreseeable GHG-generating activities include the continued operations and the development of new phosphate mining and processing projects, ongoing and general traffic, agricultural operations, small industrial heating sources, and other commercial and industrial activities. Quantitative data on these varied sources that are not directly associated with phosphate mining are not readily available, but their contribution is small compared to phosphate mining and processing operations, and they are expected to remain approximately equal to present conditions for the CEA. As technology advances, implementation of other types of equipment (such as renewable power sources or hydrogen fuel cells) for operations within the CEA may be more economically feasible in the future. Lower GHG-emitting engines for vehicles may possibly reduce GHG emissions in the foreseeable future.

5.2.2.5 Cumulative Activities

Phosphate mining and processing; agricultural operations; deforestation; and burning of fossil fuels such as coal, oil, and natural gas for power-generating engines are all activities within the CEA contributing to GHG emissions. Other natural activities (such as soil respiration and decomposition and plant and animals respiration) are sources of GHG emissions, which account for a much larger impact than human sources. Human sources of GHG emissions are much smaller in scale than natural sources, but carry the potential to upset the balance in the existing carbon cycle (DOE 2008). The Proposed Action and RCA include only phosphate mining operations and do not incorporate phosphate processing. Phosphate processing activities are ongoing at the Conda Phosphate Plant approximately 5 miles north of Soda Springs, Idaho on State Route 34. The phosphate processing plant contributes to GHG emissions at a larger scale than the mining activities, as CO_2 is produced not only by fossil fuel combustion also from wet-processing of phosphate rock to generate phosphoric acid (USEPA 2011b) with CO_2 as a byproduct.

5.2.2.6 Cumulative Effects

Phosphate mining and processing contributes to GHG emissions within the CEA. Active mines in the CEA for climate are Smoky Canyon, Blackfoot Bridge, Enoch Valley, Lanes Creek, and the Rasmussen Ridge Mines, which contribute to the cumulative GHG emissions (BLM 2015c). The foreseeable future includes the completion of mining at mines such as the Rasmussen Ridge Mines. GHG emissions from closed mines would no longer contribute to the cumulative effects during the life of proposed mining activities. Agrium's contribution to climate change effects as a result of the Rasmussen Valley Mine and cumulative activities would be similar to existing conditions because GHG emissions generated from Agrium's Rasmussen Ridge Mines operations would end, while the Rasmussen Valley Mine operations would begin to generate GHG. Therefore Agrium's contribution to the cumulative effects would not be cumulative but would remain at approximately the same level for the additional life of the Rasmussen Valley Mine.

Phosphate mining and processing has been ongoing in the region since the early 1900s and increased in the latter half of that century. Comparative data on climate have not been linked to mining activity, but it can be assumed that the GHG emissions from mining and processing of phosphate have contributed to climatic trends. The major contributors in this scenario are the processing plants.

The GHG emissions from the Proposed Action or the RCA would not generate noticeable impacts to climate change beyond the existing cumulative impacts for the CEA. The addition of GHG from the Proposed Action or RCA to the cumulative GHG emissions within the CEA would have a short-term and negligible effect on climate change.

5.2.3 Noise

5.2.3.1 CEA Boundary

The CEA for noise is the Study Area, adjacent mining activity at the Rasmussen Ridge Mines, and sensitive noise receptors within 1.5 miles including the area along Blackfoot River Road and Lanes Creek County Road (**Figure 5.2-1**). This CEA also includes all other nearby receptors, where the noise produced from the operations may affect residents' lives. Noise from mining is attenuated by vegetation and topography to levels that are not detectable to humans over long distances. Noise related to access traffic and haul roads is important to persons along nearby public roads and to all nearby residences.

5.2.3.2 Introduction

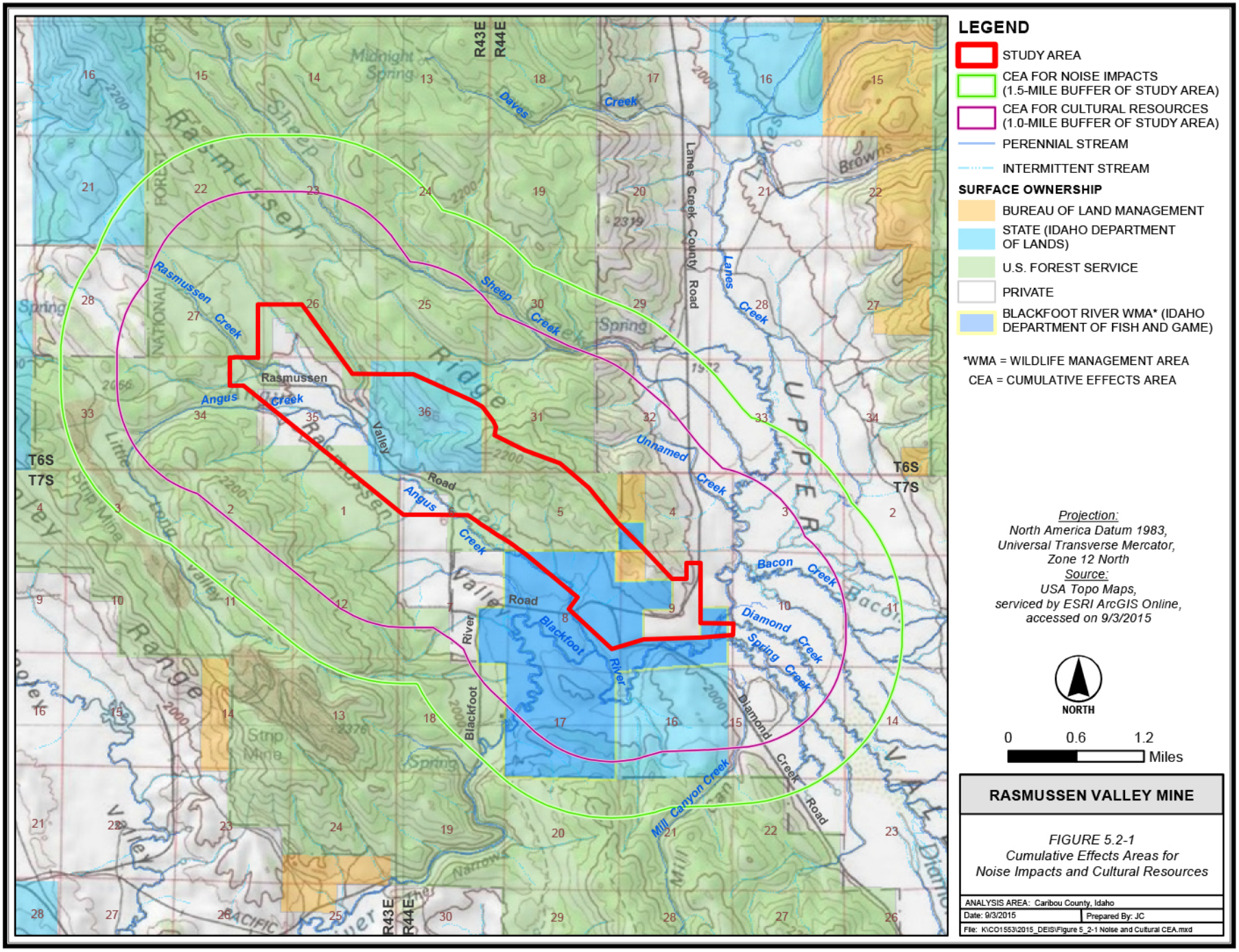
Within the noise impacts CEA, the only operating mines that may overlap in time with the Proposed Action or the RCA are the Rasmussen Ridge Mines, the Enoch Valley Mine, and the Lanes Creek Mine. When mining begins for the Proposed Action or the RCA, the Rasmussen Ridge Mines mining operations would have ceased, but reclamation would continue. There may be a gap in time between the end of mining at the Rasmussen Ridge Mines and the beginning of mining at the Proposed Action or the RCA, but the nearby Lanes Creek Mine would continue to operate during this period. Noise impacts from the Proposed Action or the RCA would replace the impacts generated from the Rasmussen Ridge Mines operations. The existing mines do not impact sensitive receptors in the CEA. The effects of adding the Proposed Action or the RCA to existing and foreseeable future disturbances are not expected to result in adverse cumulative impacts.

5.2.3.3 Past and Present Activities

Past and present disturbances contributing to noise include vehicular traffic on State Highway 34, Blackfoot River Road, Lanes Creek Road, the haul roads, and from the railroad at the Wooley Valley Tipple. Noise from vehicular traffic and the railroad are short-term and intermittent. Past mine operations would no longer contribute to noise impacts.

5.2.3.4 Foreseeable Future Activities

Foreseeable noise contributions include the continued operations and the development of new phosphate mining and processing projects, vehicular traffic, and the railroad at the Wooley Valley Tipple. Noise from vehicular traffic and the railroad would be short-term and intermittent. As the Rasmussen Ridge Mines, adjacent and north-west of the Proposed Action or the RCA, begins to cease operations, the noise from the Proposed Action or the RCA would replace the noise impacts from the past mine operations. If a future mine were to begin operating in the CEA or within 2 miles of the Study Area, there is potential for cumulative impacts to noise.


LEGEND
STUDY AREA
CEA FOR NOISE IMPACTS (1.5-MILE BUFFER OF STUDY AREA)
CEA FOR CULTURAL RESOURCES (1.0-MILE BUFFER OF STUDY AREA)
PERENNIAL STREAM
INTERMITTENT STREAM
SURFACE OWNERSHIP
BUREAU OF LAND MANAGEMENT
STATE (IDAHO DEPARTMENT OF LANDS)
U.S. FOREST SERVICE
PRIVATE
BLACKFOOT RIVER WMA* (IDAHO DEPARTMENT OF FISH AND GAME)
*WMA = WILDLIFE MANAGEMENT AREA
CEA = CUMULATIVE EFFECTS AREA
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps,
serviced by ESRI ArcGIS Online,
accessed on 9/3/2015
NORTH
0 0.6 1.2
Miles
RASMUSSEN VALLEY MINE
FIGURE 5.2-1
Cumulative Effects Areas for
Noise Impacts and Cultural Resources
ANALYSIS AREA: Caribou County, Idaho
Date: 9/3/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Figure 5_2-1 Noise and Cultural CEA.mxd
R43E
R44E
T6S
T7S
Rasmussen Creek
Sheep Creek
Angus Creek
Valley Road
Unnamed Creek
Bacon Creek
Diamond Creek
Spring Creek
Blackfoot River
Lanes Creek
Lanes Creek County Road
Mill Canyon Creek
Rasmussen Ridge
Upper Valley
Strip Mine
Midnight Spring
Daves Creek
Browns Creek
Narrows
Pacific

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5.2.3.1 Cumulative Activities

Past, present, and reasonably foreseeable noise activities in the CEA have been and would be predominantly associated with noise localized to the mining areas.

Cumulative activities for the Proposed Action or the RCA would remain the same and would not impact differently for noise levels within the CEA.

5.2.3.2 Cumulative Effects

Noise sources from the Proposed Action or the RCA would not impact sensitive receptors within the CEA. The nearest residence or area of human activity is a seasonal residence approximately 0.5 mile south of the Study Area. The noise from Rasmussen Valley and other mining operations would likely not overlap unless new nearby mines are developed within the CEA. Instead, noise would be localized to each phosphate mine. The cumulative noise profile from the Study Area to the closest sensitive receptors would result in unnoticeable or minor change in noise activities, as the Proposed Action or the RCA would replace the noise impacts from the Rasmussen Ridge Mines operations.

It is possible that the proposed Lanes Creek Mine operations would overlap temporally with operations at the Rasmussen Valley Mine. Therefore, the probability of cumulative noise pollution in the CEA may increase noise impacts from cumulative haul activities from all mine activities. Cumulative effects resulting from within the CEA are anticipated to be similar for the Proposed Action or the RCA, and would not impact differently within the CEA. The addition of Proposed Action or RCA to the increased cumulative effects to noise resources would be short-term and negligible.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no effects to air resources, climate, and noise.

5.3 WATER RESOURCES

5.3.1 CEA Boundary

Analysis of the effects of the Proposed Action and RCA on water resources is limited to the mining-influenced area in the vicinity of the Rasmussen Valley Mine. The water resources analysis area is the same as that described for the geology analysis area (**Section 4.4.1**) and extends beyond the Study Area to include areas that may be incorporated into the contaminant fate and transport model developed for the analysis.

The water resources analysis area boundaries are chosen to encompass the entire Study Area and surrounding topographic and geologic features. The southern boundary follows the trace of the Blackfoot Fault, a major strike-slip fault with upwards of 1 mile of displacement. The western boundary encompasses the southwestern flank of Rasmussen Valley and includes the Henry Thrust Fault. The northern boundary includes the Rasmussen Fault, a large strike-slip fault with nearly 1 mile of displacement in the vicinity of the Study Area. The northeastern corner is extended to encompass the Study Area, and the eastern boundary is drawn to include Lanes Creek and a portion of the Upper Valley (**Figure 3.1–1**).

The CEA for water resources is the Upper Blackfoot River drainage basin and its contributing tributaries (**Figure 5.3-1**). This includes the Upper Blackfoot River Watershed (Hydrologic Unit

Code [HUC] 1704020702) and Lanes Creek-Diamond Creek Watershed (HUC 1704020701) from the headwaters of Lanes Creek to the Blackfoot Reservoir about 10 miles to the west. The CEA encompasses approximately 223,389 acres within the eastern portion of the Blackfoot Sub-basin (HUC 17040207) that may be affected by the Proposed Action or RCA and other existing and reasonably foreseeable future projects. CEA boundaries, as well as locations of past and present mining activities, are depicted on **Figure 5.3-1**.

5.3.2 Introduction

Cumulative effects on water resources resulting from other past and present activities in the CEA include primarily phosphate mining, ranching and farming, but also include timber harvesting; livestock grazing; wildfires and fire suppression activities; road building; and development of domestic, commercial, and industrial land parcels.

Water quality issues in the CEA include COPCs leaching from phosphate mine overburden and sedimentation from a variety of other sources such as road construction, timber harvesting, livestock grazing, and any other ground-disturbing activities. Agricultural practices also impact water quality through the introduction of fertilizers and animal and vegetation waste. Various land use practices, such as mining, farming, grazing, and construction activities, can impact surface water by affecting volume and timing of surface runoff and through alteration of natural channel morphology.

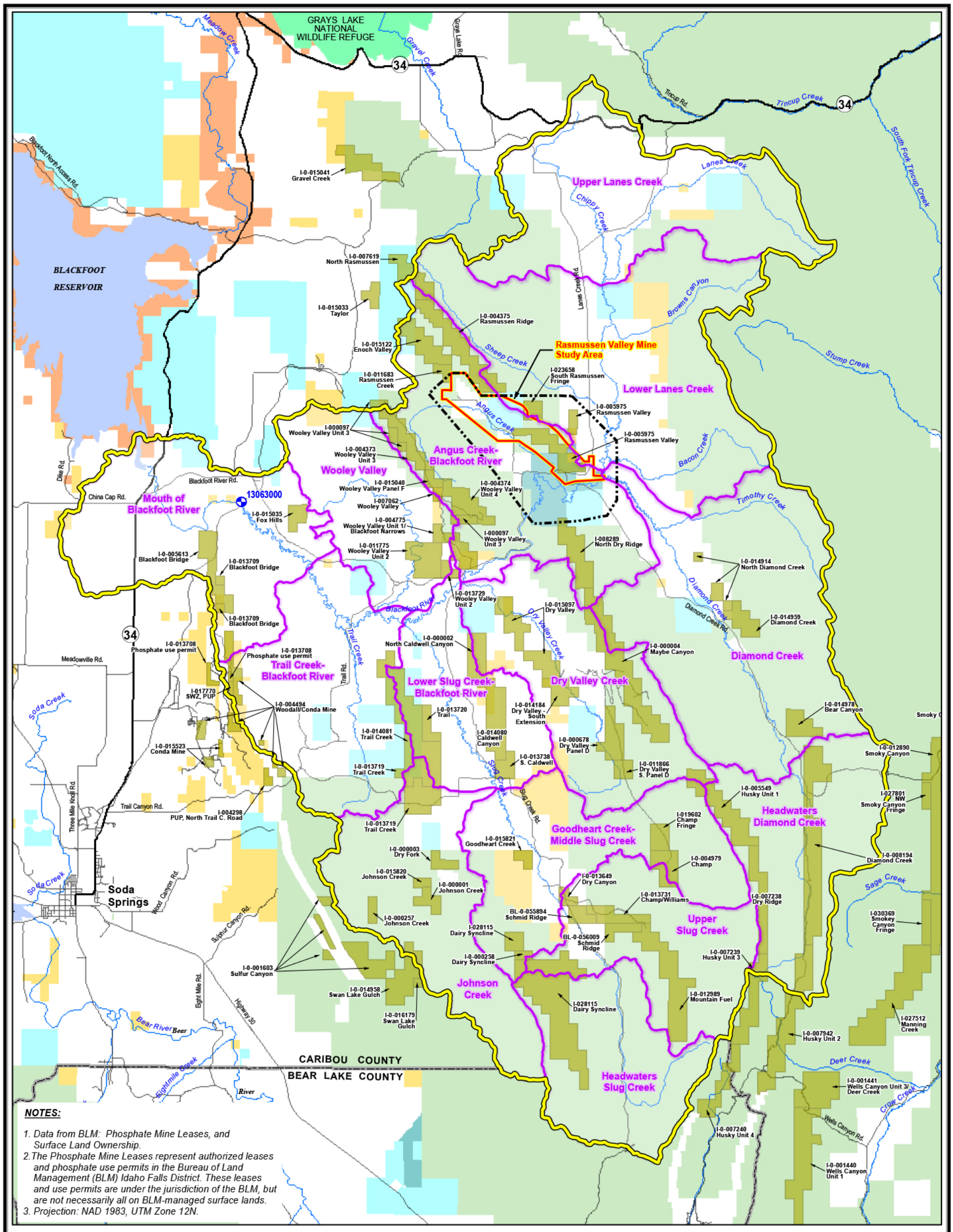
Cumulative effects to surface water resources may include increases of COPC concentrations from the Proposed Action and sediment load in streams, ponds, and springs, and impacts to water quantity related to changes in volume and timing of surface runoff.

Cumulative effects to groundwater resources may include increases of COPC loading in local-, intermediate-, and regional-scale aquifers and changes in depth to groundwater as a result of pumping or decreased infiltration rates.

5.3.3 Past and Present Activities

Many human activities have affected streams, riparian areas, and watersheds in the CEA. Beginning about 1870, logging decreased forest cover in many of the more accessible forested tributary valley and foothill areas, which resulted in reduced infiltration and increased storm runoff peaks and volumes. Intensive livestock grazing on open lands over years depleted soils of upper organic layers which absorb and hold rain and snowmelt. Organic layers increase the volume of moisture available later in the year and decrease runoff volumes and peak flows (USDA 2009).

Exclusion of fire in the 1900s has increased transpiration rates through change in vegetation communities which translated to lower groundwater recharge and summertime streamflows. Reduction of willows in 1950s contributed to bank stability problems, causing increased sediment loading in streams from bank erosion and overly widened channels. It also resulted in higher water temperatures as a result loss of shading vegetation along stream banks. Construction of roads and the use of off-road motorized vehicles such as all-terrain vehicles (ATVs) have increased the soils erosion in the watershed (USDA 2009).


GRAYS LAKE NATIONAL WILDLIFE REFUGE
Meadow Creek
Gravel Creek
Grays Lake Rd.
34
Tincup Rd.
Tincup Creek
South Fork Tincup Creek
Blackfoot North Access Rd.
I-0-015041 Gravel Creek
Upper Lanes Creek
Lanes Creek
Chippy Creek
BLACKFOOT RESERVOIR
I-0-007619 North Rasmussen
I-0-015033 Taylor
Lanes Creek Rd.
Browns Canyon
I-0-004375 Rasmussen Ridge
Sheep Creek
I-0-015122 Enoch Valley
Rasmussen Valley Mine Study Area
Stump Creek
I-0-011683 Rasmussen Creek
I-023658 South Rasmussen Fringe
Lower Lanes Creek
I-0-005975 Rasmussen Valley
I-0-005975 Rasmussen Valley
Angus Creek
I-0-000097 Wooley Valley Unit 3
I-0-004373 Wooley Valley Unit 3
Angus Creek-Blackfoot River
Bacon Creek
Wooley Valley
Dike Rd.
Blackfoot River Rd.
China Cap Rd.
Mouth of Blackfoot River
13063000
I-0-015040 Wooley Valley Panel F
I-0-004374 Wooley Valley Unit 4
I-0-007062 Wooley Valley
Timothy Creek
I-0-015035 Fox Hills
I-0-004775 Wooley Valley Unit 1/ Blackfoot Narrows
I-0-000097 Wooley Valley Unit 3
I-0-011775 Wooley Valley Unit 2
I-0-008289 North Dry Ridge
I-0-005613 Blackfoot Bridge
I-0-013709 Blackfoot Bridge
I-0-014914 North Diamond Creek
Diamond Creek
Diamond Creek Rd.
I-0-013729 Wooley Valley Unit 2
Blackfoot River
I-0-015097 Dry Valley
Dry Valley Creek
I-0-013709 Blackfoot Bridge
I-0-014959 Diamond Creek
34
I-0-013708 Phosphate use permit
I-0-013708 Phosphate use permit
Trail Creek
I-0-000002 North Caldwell Canyon
I-0-000004 Maybe Canyon
Meadowville Rd.
Trail Creek-Blackfoot River
Trail Rd.
Diamond Creek
Lower Slug Creek-Blackfoot River
Dry Valley Creek
I-0-017770 SWZ, PUP
I-0-004494 Woodall/Conda Mine
I-0-013720 Trail
I-0-014184 Dry Valley - South Extension
I-0-014978 Bear Canyon
Soda Creek
I-0-014081 Trail Creek
I-0-014080 Caldwell Canyon
I-0-012890 Smoky Canyon
I-0-015523 Conda Mine
I-0-000678 Dry Valley Panel D
I-0-013738 S. Caldwell
I-0-013719 Trail Creek
I-0-011866 Dry Valley S. Panel D
Slug Creek
Slug Creek Rd.
I-0-005549 Husky Unit 1
Three Mile Knoll Rd.
Trail Canyon Rd.
I-004298 PUP, North Trail C. Road
I-027801 NW Smoky Canyon Fringe
Headwaters Diamond Creek
I-0-019602 Champ Fringe
I-0-013719 Trail Creek
Goodheart Creek-Middle Slug Creek
I-0-015821 Goodheart Creek
I-0-000003 Dry Fork
I-0-008194 Diamond Creek
I-0-004979 Champ
I-0-015820 Johnson Creek
I-0-013649 Dry Canyon
Soda Springs
Wood Canyon Rd.
I-0-000001 Johnson Creek
I-0-013731 Champ/Williams
I-0-007238 Dry Ridge
Sulphur Canyon Rd.
BL-0-055894 Schmid Ridge
Upper Slug Creek
I-0-030369 Smokey Canyon Fringe
I-0-000257 Johnson Creek
I-028115 Dairy Syncline
BL-0-056009 Schmid Ridge
I-0-007239 Husky Unit 3
I-0-001603 Sulfur Canyon
I-0-000258 Dairy Syncline
Sage Creek
Eight Mile Rd.
Highway 30
Johnson Creek
I-0-014958 Swan Lake Gulch
I-028115 Dairy Syncline
I-0-012989 Mountain Fuel
Bear River
Bear River
I-0-016179 Swan Lake Gulch
I-027512 Manning Creek
I-0-007942 Husky Unit 2
CARIBOU COUNTY
BEAR LAKE COUNTY
Deer Creek
Headwaters Slug Creek
I-0-001441 Wells Canyon Unit 3/ Deer Creek
Crow Creek
I-0-007240 Husky Unit 4
Wells Canyon Rd.
I-0-001440 Wells Canyon Unit 1
NOTES:
1. Data from BLM: Phosphate Mine Leases, and Surface Land Ownership.
2. The Phosphate Mine Leases represent authorized leases and phosphate use permits in the Bureau of Land Management (BLM) Idaho Falls District. These leases and use permits are under the jurisdiction of the BLM, but are not necessarily all on BLM-managed surface lands.
3. Projection: NAD 1983, UTM Zone 12N.
LEGEND
USGS GAGING STATION
STUDY AREA
WATER RESOURCES ANALYSIS AREA
CUMULATIVE EFFECTS AREA FOR WATER RESOURCES; SOILS; VEGETATION; RIPARAIN AREAS AND WETLANDS; AND FISHERIES AND AQUATIC RESOURCES
SUBWATERSHED BOUNDARY
PHOSPHATE MINE LEASE
STATE ROUTE
OTHER ROAD
MAJOR STREAM/RIVER
SURFACE LAND OWNERSHIP
INDIAN RESERVATION
BUREAU OF LAND MANAGEMENT
NATIONAL WILDLIFE REFUGE
STATE OF IDAHO: FISH & GAME; PARK & RECREATION
STATE OF IDAHO: OTHER
US FOREST SERVICE
PRIVATE
NORTH
0
3
6
Miles
RASMUSSEN VALLEY MINE
FIGURE 5.3-1
Cumulative Effects Area for Water Resources; Soils; Vegetation; Riparain Areas and Wetlands; and Fisheries and Aquatic Resources
ANALYSIS AREA: Caribou County, Idaho
Date: 9/3/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Chapter 5\Figure 5_3-1 Water CEA.mxd

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Previous phosphate mining operations have left open pits and overburden piles scattered throughout the watershed. Older mining practices left shale materials with elevated levels of selenium and other COPCs either exposed at the surface or with shallow or no cover. Older overburden piles generally do not have engineered covers to restrict infiltration, and the surfaces may have shallow slopes or rough surfaces that do not minimize infiltration of precipitation. Seepage from many of the overburden disposal sites contain COPCs at elevated concentrations that may be transported into streams (USDA 2009). Selenium is the COPC of greatest regulatory concern in the CEA.

As of 2012, 18 large-scale phosphate mines were present in southeast Idaho, with five active and 13 inactive operations (Mebane et al. 2015). Twelve of these mines are located within the CEA boundary (**Figure 5.3-1**), and four of the mines within the water resources CEA are active. Total disturbances related to past, present, or currently agency-approved mining and mining-related activities are estimated to be approximately 8,841 acres (**Table 5.3-1**). An additional 7,230 acres of disturbance from phosphate mining that is not yet approved is reasonably foreseeable.

Table 5.3-1 Total Existing and Reasonably Foreseeable Disturbances for Phosphate Mines in the Water Resources CEA

Mine	Years of Operation	Disturbed Area (Acres)
Ballard	1952 to 1969	635
North and South Maybe Canyon	1951 to 1995	1,028
Wooley Valley	1955 to 1989	808
Mountain Fuel	1966 to 1967, 1985 to 1993	781
Henry	1969 to 1989	1,074
Lanes Creek	1978 to 1989, 2015 to Present	214
Champ and Champ Extension	1982 to 1985	460
Enoch Valley	1990 to Present	808
Rasmussen Ridge Mines	1991 to Present	858
South Rasmussen	2003 to Present	390
Dry Valley	1992 to 2014	1,082
Blackfoot Bridge	2013 to Present	703
Dairy Syncline	Not yet approved*	1,779 (estimate)
Diamond Creek/Freeman Ridge	Not yet approved*	1,200 (estimate)
Husky 1/North Dry Ridge	Not yet approved*	1,051 (estimate)
Trail Creek	Not yet approved*	1,000 (estimate)
Dry Ridge	Not yet approved*	1,000 (estimate)
Caldwell Canyon	Not yet approved*	1,200 (estimate)
Estimated Total Disturbed Acres		**16,071**

Notes:

* From **Table 5.1-2**, Reasonably Foreseeable Disturbance Expected from Phosphate

Sources: BLM and USFS 2007; BLM 2014; P4 2015

Investigations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) have been initiated for six of the mines to assess the contamination and potential risks associated with the sites. Previously approved mining sites that are being evaluated under CERCLA include the Enoch Valley Mine, Ballard Mine, North Maybe Mine, South Maybe Canyon Mine, Champ Mine, and Mountain Fuel Mine. Currently, there are four operations actively mining phosphate within the CEA: Blackfoot Bridge Mine, Enoch Valley Mine, Lanes Creek Mine, and Rasmussen Ridge Mines. Dry Valley Mine and Henry Mine have been

reclaimed and South Rasmussen Mine is currently in reclamation phase. The Wooley Valley Mine has been mined out.

Past and present mining activities in the CEA have resulted in increased selenium concentrations in the Blackfoot River and some of its tributaries. In 2001, IDEQ began an annual, mid-May, synoptic survey of selenium concentrations at 21 locations in the Upper Blackfoot River Watershed to assess water quality impacts from phosphate mining operations. In cooperation with BLM, the U.S. Geological Survey (USGS) collected time series (2001-2014) water quality parameters at a single location on Blackfoot River near the inlet to the Blackfoot Reservoir (USGS stream gage13063000). Results of both of these efforts have been evaluated by Mebane et al. (2015) to provide a view of selenium runoff in the Upper Blackfoot River Watershed.

Based on this evaluation, the Idaho chronic aquatic life (CCC) criterion for selenium of 5 micrograms per liter (µg/L) was exceeded in the majority of the samples during peak stream runoff in May of each year. Exceedances were less frequent during April and June of each year. No exceedances occurred outside the April to June spring timeframe. Low-flow season (August to October) selenium concentrations increased slightly from 2001 to 2012, but no trends were obvious for other seasons (Mebane et al. 2015). Trends in selenium during the low-flow period in 2013 and 2014 (data not tracked in Mebane et al. 2015) may indicate a flatter trend than previously reported. Selenium concentrations in the Upper Blackfoot River Watershed tend to correlate positively with streamflow (i.e., high concentrations are typically observed in years with high streamflows). Water years 2006 through 2008 were exceptions to this generalization, which suggests that streamflow is not the only factor controlling selenium concentrations in the river (Mebane et al. 2015).

The study (Mebane et al. 2015) also showed that the majority of the selenium loads passing the USGS stream gauge at the outlet of the watershed could be attributed to a single tributary (East Mill Creek), which enters the Blackfoot River through Springs Creek. Selenium loads decreased by about half from East Mill Creek before reaching the Blackfoot River, suggesting that much of the selenium is at least temporarily removed from the water column by uptake by aquatic vegetation or by losses to sediment (Mebane et al. 2015).

The historical water quality impacts have led IDEQ to list portions of the Blackfoot River and several of its tributaries (including State Land Creek, Dry Valley Creek, Chicken Creek, Maybe Creek, Spring Creek, Upper Mill Canyon, Diamond Creek, Rasmussen Creek, and Angus Creek) within the CEA as Category 5 impaired waterbodies under Section 303(d) of the Clean Water Act (CWA; IDEQ 2012). The most frequently identified causes of impairment in the CEA are selenium, dissolved oxygen, *Escherichia coli*, and temperature (IDEQ 2012). These designations are important, as they represent a situation where cumulative effects to surface water have reached a regulatory threshold where actions to reduce impacts to the water bodies must be undertaken and newly proposed activities cannot add impacts or load to the water bodies.

Additionally, the Blackfoot River and several tributaries (including Slug Creek, Dry Valley Creek, Chicken Creek, Maybe Creek, Diamond Creek, Lanes Creek, Bacon Creek, Sheep Creek, Angus Creek, Rasmussen Creek, and State Land Creek) have been identified as Category 4a waters impaired by sediment loads with U.S. Environmental Protection Agency (USEPA)-approved total maximum daily loads (TMDLs; IDEQ 2012).

5.3.4 Foreseeable Future Activities

Foreseeable future activities that carry the potential to affect water resources in the CEA include future phosphate mining activities on areas that have not been developed, currently operating phosphate mines, remediation of inactive mines, agricultural and livestock range land uses, and construction activities resulting in ground disturbance.

Reasonably foreseeable future mining activities within the CEA are illustrated in **Figure 5.3-1**. Approximately 7,230 acres of mining-related disturbances can be expected in the reasonably foreseeable future within the CEA. These include three near future (currently processing applications) surface mining phosphate operations at Dairy Syncline, Husky1/North Dry Ridge, and Caldwell Canyon Mines, as well as three future applications at Diamond Creek/Freeman Ridge, Trail Creek, and Dry Ridge Mines (**Table 5.3-1**).

CERCLA investigations and remedial actions may occur at phosphate mining sites within the CEA. Remedial activities could include regrading, capping, and revegetation of existing overburden piles or backfills; backfilling of pits; and removal of overburden that was placed as cross-valley fills. Remedial activities would be designed to mitigate existing sources of COPCs associated with these sites and minimize contaminated seepage from existing overburden disposal facilities and sediment loading to surface water from past mining disturbances.

Mining is an important economic resource for the State of Idaho; therefore, it is anticipated that the trend for phosphate mining resource development within the watershed will continue into the future at a similar or accelerated pace as a result of improvements in mining equipment and ore recovery optimization.

Changes to private agricultural lands are likely as portions of these lands are converted into low-density residential areas. Near-term development of private agricultural lands within the CEA is expected to be limited because Caribou County has identified infilling of existing city limits and impact areas, rather than expansion into rural areas, as a growth goal (Caribou County 2006). Future quantities, extents, and types of grazing activities within the CEA are not expected to vary from current activities.

5.3.5 Cumulative Effects

Past, ongoing, or reasonably foreseeable activities or events would have a cumulative effect on water resources under Proposed Action. From all identified developments within the CEA, mining carries the greatest potential to cumulatively impact water resources. However, other activities such as farming, grazing, road construction, and recreational uses also carry the potential to cumulatively affect water resources.

Cumulative impacts to groundwater quality would primarily occur where metals are mobilized during mining at proposed and operating mines, and by leaching of COPCs from overburden at active, historical, and proposed phosphate mine sites. Contaminant fate-and-transport modeling results indicate that, under the Proposed Action, contamination of shallow- and intermediate-scale aquifers at Rasmussen Valley would be localized and of limited extent, and would not cumulatively affect the groundwater quality in the CEA outside of the Study Area. Modeling results also suggest that impacts from intermediate-scale aquifers will not reach the Wells Regional Aquifer. However, groundwater quality within the Wells Regional Aquifer may be cumulatively affected by mining activities in the CEA. The Proposed Action or RCA would be located along the regional groundwater flow path, but upgradient from the Enoch Valley and

Rasmussen Ridge Mines. Contamination from these mines, when combined with the predicted COPC loading of groundwater from the selected alternative, would carry the potential to result in cumulative impacts to the Wells Regional Aquifer. The Lanes Creek Mine is hydrologically located within the same regional aquifer but on a separate flow path from the Rasmussen Valley Mine. Although the presence of Rasmussen Fault (which is conceptualized as a partial barrier to groundwater flow) to the northwest of the Study Area will likely interrupt plume migration further downgradient of the fault location, potential discontinuity or breaks within the fault line will allow contaminant plumes to migrate and then laterally expand beyond the fault line. The potential cumulative impacts to groundwater quality in the regional aquifer within the CEA are expected to be minor to moderate and long-term for the Proposed Action. There would be no cumulative affects to shallow- and intermediate-scale aquifers in the CEA due to elimination of external stockpiles under the RCA. As described in **Section 4.3.1.2.4**, the RCA would also result in reduced loading of COPCs to the Wells Regional Aquifer due to the implementation of Cover C and changes in backfill material ratios; therefore, the cumulative impacts to Wells Regional Aquifer would be reduced compared to the Proposed Action.

Impacts from groundwater withdrawals during mining would be temporary and would only occur during active dewatering for mining below the water table for the Proposed Action. Pumping for mine dewatering would be limited to about 7 to 8 months during the Proposed Action Phase 1 operation of the Proposed Action. Mine dewatering would not be required for the RCA. Impacts related to groundwater withdrawals in the CEA outside of the Study Area would be negligible to minor, localized, and short-term. In the long term, reduced infiltration may occur as a result of capping overburden piles and backfills. Cumulative impacts to groundwater quantity may also occur from pumping related to irrigation, municipal and domestic water supply, and other industrial activities. These potential cumulative impacts to groundwater quantity in the CEA are expected to be long-term and negligible.

Cumulative impacts to surface water quality would occur primarily as a result of contaminated runoff from overburden at the previously approved mines to nearby surface water features. The Proposed Action or RCA would be located downstream from the Wooley Valley, Enoch Valley, and Rasmussen Ridge Mines. Tributaries to Angus Creek are within areas of previous mining disturbance from the above mentioned mines and could result in cumulative impacts to Angus Creek. Additionally, direct recharge through mine features, such as overburden disposal areas, can impact surface water features through migration via shallow groundwater, or leaching from contaminated shallow/intermediate groundwater flow systems may infiltrate into the regional flow system. Although the regional flow system does not discharge to surface water features (including Blackfoot River) within the analysis area (**Figure 5.3-1**), it could potentially transport and discharge contaminants into surface water features in the CEA.

Soil erosion within the CEA has contributed to reduced water quality in various surface water bodies. The Draft 2012 Integrated 303(d)/305(b) Report (IDEQ 2012) lists the Blackfoot River, as well as several tributaries (Slug Creek, Dry Valley Creek, Chicken Creek, Maybe Creek, Diamond Creek, Lanes Creek, Bacon Creek, Sheep Creek, Angus Creek, Rasmussen Creek, and State Land Creek) as Category 4a waters impaired by sediment loads with USEPA-approved TMDLs (IDEQ 2012). Excessive sediment levels in the CEA have not been attributed to a specific source and have likely resulted from a combination of activities within the CEA.

As discussed in **Section 5.3.3**, the Blackfoot River has been impacted by increased selenium concentration from phosphate mining activities in the CEA. The predicted project-related selenium load under the Proposed Action would result in minor increases of instream concentrations in Blackfoot River and moderate increases of instream concentrations in Angus

Creek. Based on the impact analysis discussed in **Section 4.3.1.2.3**, there would be no project-related impacts from selenium loading to surface water features under the RCA. Cumulative effects to surface water quality resulting from past, present, and other foreseeable future mining activities in the CEA are moderate to major and long-term until remediation actions at inactive mines reduce selenium load to streams. Additional effects from the Proposed Action or RCA would have negligible effect within the CEA.

Surface-disturbing activities from mining and reclamation at Rasmussen Valley Mine would increase sediment loads to streams. However, the implementation of best management practices (BMPs) would reduce this sediment loading. These effects are expected to be most pronounced during rainstorms and spring runoff. BMPs and other controls would result in negligible sediment loading. Cumulative increases in sediment loads within CEA are expected to be minor, local, and short-term.

Long-term increased runoff as a result of capping of reclaimed areas may result from some or all of the mines within the CEA. These impacts would be localized and negligible in the CEA.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no new effects to water resources.

5.4 SOILS

5.4.1 CEA Boundary

The CEA for soils is illustrated on **Figure 5.3-1**. Soil and water resources share the same CEA as a result of the indirect effect that soil disturbance has on surface water quality from erosion and sediment transport as discussed in **Section 5.3.5**.

5.4.2 Introduction

Direct impacts to soil resources typically occur as a result of ground-disturbing activity. Activities affecting soils, and that are themselves affected by soil disturbance within the CEA, could include mining; farming; ranching; livestock grazing; wildfires; fire suppression activities; timber harvest and management; road building; recreation; and development of domestic, commercial, and industrial land parcels. Potential impacts to soil resources include damage or removal of topsoil and subsoil profiles and structure, slope failure, and weathering processes and subsequent erosion. Although disturbed soil will develop new profiles over extended periods of time, cumulative impacts to soils can include the loss of productivity and increased risk of exposure to people and facilities due to slope failures.

The most extensive impacts to soils in the CEA would likely result from mining, agricultural, and timber harvesting activities. Because the success of mine reclamation largely depends on reuse of stockpiled or live-handled topsoil, and because all mines are required to implement a Storm Water Pollution Prevention Plan (SWPPP), impacts to soils beyond initial disturbance and relocation (e.g., soil loss through erosion) are minimized. The success of the agricultural industry is also inherently dependent on maintaining soil quantity and quality, and soil management practices are widely implemented during these activities. Forest management activities on the Caribou-Targhee National Forest (CTNF) include timber sales, livestock grazing, and public recreation. Extensive portions of the soil resource CEA are located on lands administered by the CTNF. Activities in these areas are subject to management goals and standards provided in the Caribou National Forest (CNF) Revised Forest Plan (RFP) (USFS 2003b). Forest management activities (including

timber sales, livestock grazing, and public recreation) are not expected to contribute to cumulative effects on soil resources within the CEA.

5.4.3 Past and Present Activities

Past and present disturbances within and near the CEA are similar to those discussed in **Section 5.3.3**. Many former and current human activities within the CEA can increase sediment loads to streams. Livestock grazing carries the potential to affect soil resources by decreasing the vegetative cover, destroying the microbiotic crust (which increases the erodibility of soils), and increasing compaction (which decreases soil tilth). Localized damage in areas adjacent to waterways can destroy stream banks and allow sediment to directly enter the water system.

Mining activities have major impacts on soil resources within in the CEA. Soils are directly impacted by removal and storage during open pit excavations and subsequent replacement during reclamation. Successful reuse of soils is a primary goal of mine reclamation and is a critical component of maintaining soil productivity. Soil disturbances related to approved past and present mining and mining-related activities within the CEA are estimated to be approximately 9,600 acres. This acreage does not include reasonably foreseeable future disturbances that are not yet approved (approximately 8,400 acres).

Typical recreation activities in the CEA include hunting, fishing, and other outdoor activities. Generally, these activities have a lesser impact on soils resources than other uses as a result of their intermittent and seasonal nature. Effects on soils resources as a result of past and present recreation are limited to compaction from off-road vehicle travel, runoff from dirt roads, and hiking or pack trails.

Soil erosion hazards across the Study Area are generally low or moderate (**Table 3.4-5**). Soil survey data are not available for the majority of the CEA; however, Natural Resources Conservation Service (NRCS) data for southeastern Bingham County (immediately north of the CEA) and portions of the CTNF northeast of the CEA indicate that soil erosion hazards within the CEA likely range from low to moderate along valley floors and from moderate to severe in the mountain ranges and foothills (NRCS 2014).

5.4.4 Foreseeable Future Activities

Mining could occur on lease areas that have not been developed, which would result in disturbance to soil resources. Reasonably foreseeable future mining activities within the CEA are summarized in **Table 5.1-2**. Approximately 8,400 acres of reasonably foreseeable disturbances can be expected within the CEA, of which about 549 acres would remain unreclaimed.

Future quantities, extents, and types of grazing activities within the CEA are not expected to vary from current activities. Present rates of soil loss in agricultural areas are expected to be maintained in the foreseeable future. Changes to private agricultural lands and disruption of soils are likely as portions of these lands are converted into low-density residential areas. Caribou County has identified infilling of existing city limits and impact areas rather than expansion into rural areas as a growth goal (Caribou County 2006). Although difficult to ascertain the level of effect, implementation of policies intended to encourage such growth and maintain large tracts of open space within the county (e.g., Policies 2.1.1 and 13.1.1) may slightly discourage future development of agricultural lands and loss of soil resources and slightly reduce the potential for long-term cumulative effects. Timber sales are anticipated to

continue similar to current levels, with constraints on soil disruption similar to those in recent years (USFS 2003b). No known changes to transportation or recreational uses beyond those identified in the Proposed Action and RCA have been proposed that would affect soil resources within the CEA.

5.4.5 Cumulative Activities

Cumulative disturbances of soil resources within the CEA as a result of past, present, and reasonably foreseeable developments, including the Proposed Action or the RCA, would primarily be the result of phosphate mining activities and agricultural practices. Additional disturbances of soils as a result of timber sales and residential development would also occur but would be of smaller scale.

5.4.6 Cumulative Effects

Combined past, present, and reasonably foreseeable future mining activities within the CEA are expected to directly affect about 10,500 acres of soils or 4.7 percent of the soils CEA. As for Rasmussen Valley, future mines are expected to salvage, stockpile, and replace soils during reclamation and to use soil erosion and sediment transport BMPs to control soil loss from disturbance areas. Soil productivity would decrease, and soil erosion rates would increase on disturbed soils. The impact duration from soil disturbance is expected to vary according to mine-specific reclamation practices. Other than the long-term soil profile development, impacts would not be expected to extend more than 3 or 4 years beyond final reclamation. The 549 acres of unreclaimed disturbances from all mining activities in the area would represent a long-term impact to less than 1 percent of soils within the CEA.

BMPs would be designed to contain sediment derived from mining disturbance. Because soil loss would be controlled by installation of water retention ponds, runoff control ditches, and implementation of other BMPs, soil erosion as a result of the Proposed Action or the RCA is expected to be minimal.

Agricultural, recreation, forestry, and land development activities would continue to contribute to soil loss within the CEA. Similarly, increased regulatory control on soil erosion, verified by reclamation monitoring, is expected to minimize impacts to soil productivity and erosion within the CEA. The short- and long-term contributions of the Proposed Action or the RCA to cumulative effects on soil resources are expected to be minor in the CEA.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no new effects to soil resources.

5.5 VEGETATION, RIPARIAN AREAS, AND WETLANDS

5.5.1 CEA Boundary

The CEA for vegetation, riparian areas, and wetlands is the same as that defined for surface water and soils. The CEA for vegetation, riparian areas, and wetlands encompasses the Upper Blackfoot River Watershed (HUC 1704020702) and Lanes Creek-Diamond Creek Watershed (HUC 1704020701) from the headwaters of Lanes Creek to the Blackfoot Reservoir about 10 miles to the west. The CEA encompasses approximately 223,389 acres within the eastern portion of the Blackfoot Sub-basin (HUC 17040207) that may be affected by the Proposed Action or the

RCA and other existing and reasonably foreseeable future projects. CEA boundaries, as well as locations of past and present mining activities, are depicted on **Figure 5.3-1**.

5.5.2 Introduction

Vegetation disturbance in the CEA occurs from activities associated with mining, agriculture, grazing, vegetation management, wildfires, controlled burns, and off-road vehicle use. The reasonably foreseeable developments in the CEA include the continuation of past and present disturbances. **Table 5.5-1** provides the vegetation types and the amount of acreage that each vegetation type occupies within the CEA. The CEA as described above is a larger area than the vegetation analysis area discussed in Chapter 4. Vegetation and fresh water accounts for approximately 99 percent of the CEA (USGS 2001). According to available quantitative data, approximately 8,002 acres of past and present land uses and direct disturbances to vegetation (developed, quarries, mines, gravel pits, oil wells, cultivated cropland, pasture, and harvested forest) have occurred within the CEA (Table 5.5-1), which represents approximately 4 percent of the total CEA. Note that this does not include other disturbances in the CEA that are not quantifiable (e.g., vegetation alteration from livestock grazing).

Table 5.5-1 Existing Land Cover in Vegetation CEA

Cover Type	Acres
Undisturbed ("Native") Land Cover Types	
Inter-Mountain Basins Montane Sagebrush Steppe	54,060
Rocky Mountain Aspen Forest and Woodland	36,406
Rocky Mountain Lodgepole Pine Forest	34,022
Inter-Mountain Basins Big Sagebrush Steppe	27,286
Middle Rocky Mountain Montane Douglas-fir Forest and Woodland	20,740
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	11,304
Rocky Mountain Alpine-Montane Wet Meadow	8,971
Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland	6,429
Rocky Mountain Subalpine-Montane Mesic Meadow	5,890
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	4,947
Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland	3,314
Northern Rocky Mountain Montane-Foothill Deciduous Shrubland	884
Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland	453
Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland	336
North American Arid West Emergent Marsh	105
Northern Rocky Mountain Subalpine-Upper Montane Grassland	32
Open Water (Fresh)	18
Rocky Mountain Poor-Site Lodgepole Pine Forest	7
Rocky Mountain Foothill Limber Pine-Juniper Woodland	4
Rocky Mountain Subalpine-Montane Riparian Shrubland	1
Northern Rocky Mountain Subalpine Deciduous Shrubland	1
Rocky Mountain Subalpine-Montane Riparian Woodland	1
Rocky Mountain Lower Montane-Foothill Shrubland	<1
Subtotal	**215,211**
Disturbed ("Human-altered") Land Cover Types	
Cultivated Cropland	4,550
Developed, Open Space	1,097
Harvested Forest - Grass/Forb Regeneration	816
Harvested Forest - Northwestern Conifer Regeneration	670
Quarries, Mines, Gravel Pits and Oil Wells	359

Table 5.5-1 Existing Land Cover in Vegetation CEA

Cover Type	Acres
Pasture/Hay	275
Harvested Forest-Shrub Regeneration	211
Developed, Low Intensity	24
Developed, Medium Intensity	<1
Subtotal	**8,002**
Grand Total	**223,213**

Source: USGS 2001

According to National Wetland Inventory (NWI) data, approximately 13,767 acres of palustrine wetlands (including forested, scrub-shrub, unconsolidated bottom permanently flooded [freshwater pond]); lacustrine wetlands including unconsolidated bottom permanently flooded (lake); and riverine wetlands are present within the CEA (**Table 5.5-2**; USFWS 2015). Direct impacts to wetlands and riparian areas within the CEA have occurred. Many activities that have affected vegetation and wetlands in the past are expected to continue in the reasonably foreseeable future (e.g., agriculture, grazing, recreation, and mining).

Table 5.5-2 Existing Wetlands in CEA

Wetland Type	Cowardin Classification	Acres
Freshwater Emergent	Palustrine, Emergent, Persistent, Temporarily flooded/Saturated/Seasonally flooded/Semipermanently flooded (PEM1A/B/C/F)	11,425
Freshwater Forested/ Scrub-shrub Wetland	Palustrine, Scrub-shrub, Broad-leaved Deciduous/Forested, Needle-leaved Evergreen, Saturated (PSS1/FO4B) Palustrine, Forested, Broad-leaved Deciduous, Temporarily Flooded/Seasonally Flooded (PFO1A/C) Palustrine, Scrub-shrub, Broad-leaved Deciduous/Needle-leaved Evergreen Seasonally Flooded (PSS1/4C) Palustrine, Scrub-shrub, Broad-leaved Deciduous/Emergent, Persistent, Temporarily Flooded (PSS1/EM1A) Palustrine, Scrub-shrub, Broad-leaved Deciduous, Temporarily Flooded/Saturated/Seasonally Flooded/Semipermanently Flooded (PSS1A/B/C/F)	1,812
Freshwater Pond	Palustrine, Unconsolidated bottom, permanently flooded (PUBH) Palustrine, Unconsolidated bottom/Emergent, Persistent, Semipermanently Flooded (PUB/EM1F)	163
Lake	Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded (L1UBH)	89
Riverine	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded (R2UBH) Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded (R3UBH)	276
Other	N/A	2
Total		**13,767**

Source: USFWS 2015

5.5.3 Past and Present Activities

5.5.3.1 Vegetation

Table 5.5-1 indicates the acreage of disturbance from various past and present sources in the CEA, which totals 8,002 acres for quantified disturbance in the USGS (2001) land cover layer. Based on this layer, the principal past and present anthropogenic disturbances to vegetation within the CEA include quarries, mines, gravel pits, and oil well drilling pads, accounting for 4 percent of disturbance; agriculture (cultivated cropland, pasture/hay) accounting for 60 percent of disturbance; harvest forest activities accounting for 21 percent of disturbance; and developed areas accounting for 14 percent of disturbance.

Livestock grazing has also been a historical and traditional use of lands in the CEA, but it is not possible to quantify the acreage of vegetation that has been affected by livestock grazing. Livestock grazing has and will continue to alter vegetation community structure and annual production. In addition, grazing activities can result in specific, localized use in riparian areas from vegetation removal by cattle, as well as potentially increasing the opportunity for the introduction and spread of noxious and non-native vegetation species.

A different dataset for mining activity indicates that approximately 5,956 acres of land in the CEA have been disturbed by historical phosphate mining activity, as shown in **Figure 5.1-1** (Causey and Moyle 2001). There are an additional 2,889 acres of agency-approved disturbance in the vegetation CEA (**Table 5.1-2**, less acreage for Smoky Canyon, which is outside the CEA) for a total of 8,845 acres of historical and present phosphate mine disturbance in the CEA. However, much of this area has been reclaimed and supports grassland and shrubland plant communities that vary in plant species composition and structure depending on the seed mix and reclamation technique.

Areas of vegetation with elevated levels of selenium have been found growing on some reclaimed mine sites in the CEA, particularly those areas with vegetation growing directly in waste rock with no topsoil. The practice of growing reclamation vegetation directly in waste rock was discontinued as mines were encouraged to salvage and reuse topsoil and mining practices were changed to minimize the release of selenium in the 1990s.

The IDEQ sampled terrestrial vegetation at the Conda and Ballard Mines as part of an area-wide risk assessment study. This study found selenium concentrations ranging from 8.9 to 39 milligrams per kilogram (mg/kg) at the Ballard Mine and from 1.5 to 20 mg/kg at the Conda Mine (IDEQ 2003). Mackowiak et al. (2004) conducted a study of trace element concentrations in plants sampled at the Wooley Valley Unit 1, 3, and 4 overburden piles and undisturbed sites at Dairy Syncline, Deer Creek, Dry Valley, Maybe Canyon, and Rasmussen Ridge. The authors found the highest tissue selenium concentrations in plants growing in highly disturbed soils, such as those comprising the Wooley Valley overburden piles. Grasses, shrubs, and forbs growing on overburden piles generally exhibited lower average selenium concentrations (18 mg/kg, 6 mg/kg, and 3 mg/kg, respectively) than legumes and trees, which yielded average selenium concentrations of 80 mg/kg and 52 mg/kg. In comparison, background selenium concentrations in terrestrial plants have been reported to range from 0.01 to 0.6 mg/kg (Ohlendorf 2003).

The acreage of vegetation in the CEA with elevated selenium has not been quantified. Studies indicate that vegetation with elevated selenium concentrations is associated with historical mines. The historical mines occupy approximately 5,956 acres or 3 percent of the CEA (based

on a spatial data set prepared by Causey and Moyle 2001). The acreages associated with the historical mine sites that exceed the BLM action level of 5 mg/kg have not been quantified, but investigations show that not all areas contain vegetation with concentrations of selenium higher than the 5 mg/kg action level; therefore, it is expected that the area of exceedances are less than 5,956 acres (Causey and Moyle 2001).

5.5.3.2 Wetlands

Past and present activities that occur in the CEA, such as agricultural land uses, mining, roads, buildings, and other facilities, likely contributed to wetland impacts. Today, programs administered by various regulatory agencies have greatly reduced or eliminated a potential net loss of wetlands through some type of mitigation, whether it is enhancement, restoration, or creation.

Indirect and direct impacts resulting from agricultural activities may include draining, flooding, leveling, and grazing in wetlands. These impacts are relatively transient and reversible. In contrast, roads, buildings, and mines may have long-term or permanent impacts on wetlands as a result of long-term changes in topography and hydrology.

Indirect impacts to wetlands, such as those resulting from sedimentation and selenium contamination, have likely occurred as well in the CEA, but are difficult to quantify.

In 2014, the USGS released a report summarizing more than a decade of data (2001 to 2012) on selenium levels in streams across the Upper Blackfoot River Watershed (Mebane et al. 2015). The USGS collected selenium data from the Blackfoot River near the outlet of the Blackfoot Reservoir near Henry, Idaho from 2001 to 2012. Dissolved selenium concentrations at this site ranged from 0.5 to 11.4 μg/L, and 31 percent of the samples exceeded the State of Idaho CCC concentration of 5 μg/L. Most of the exceedances were measured in May of each year, and all exceedances occurred from April to June (coinciding with the spring runoff season). Concurrently with the USGS single-point sampling, the IDEQ sampled selenium at 21 locations along the main stem of the Blackfoot River and its tributaries in May of each year. Selenium concentrations measured during the IDEQ sampling effort ranged from less than 2 μg/L to 870 μg/L in 176 samples. Examination of the IDEQ data in concert with the USGS data revealed that the majority of the selenium loads passing the USGS sampling point could be attributed to a single stream (East Mill Creek), which is located downstream of the North Maybe Canyon Mine and enters the Blackfoot River through Spring Creek. Selenium loads decreased by about half from East Mill Creek before reaching the Blackfoot River, which suggests that aquatic vegetation or sediments sequester much of the selenium in the creek, at least temporarily (Mebane et al. 2015). Wetlands are known to filter and sequester pollutants including selenium (Peltier et al. 2003; Hansen et al. 1998; Mickle 1993). Therefore, it is possible that elevated selenium concentrations have occurred in wetland waters, plants, and sediments across the CEA given the results of the Mebane et al. (2015) study.

The USGS and IDEQ analyses published in Mebane et al. (2015) were limited to data collected through 2012. Data collection is ongoing. Preliminary inspection of the two most recent years of data (2013 and 2014) reveals noticeable differences from the previous data. First, most selenium concentrations during spring peak-flow periods in 2013 and 2014 were lower than those in several of the preceding years, although an anomalously high concentration of 0.0138 mg/L (13.8 μg/L) on May 13, 2013 was recorded. Second, from 2001 through 2012, selenium concentrations showed an increasing upward trend during the generally low-flow period between August and October, especially from about 2004 through 2012 (Mebane et al. 2015). However, visual inspection of the most recent 2 years of data suggests that this upward trend

has not continued. In 2014, selenium concentrations during low-flow periods were lower than in recent years and generally lower than the surface water standard of 0.005 mg/L (USGS 2015). Therefore, existing impacts to wetlands in the CEA from selenium may be less severe than the older data would indicate.

5.5.3.3 Noxious Weeds

No quantitative data are available on the acres currently affected by noxious weeds within the CEA or the number of acres that have been treated to combat noxious weeds. Quantified land disturbances totaling approximately 8,002 acres of past and present surface disturbances (based on GAP landcover data [USGS 2001]), 5,956 acres of historical mining disturbance (based on Causey and Moyle 2001), and 2,889 acres of current/ongoing mining (**Table 5.1-2**, excluding acreage for Smoky Canyon, which is outside the CEA) have potentially introduced and increased the susceptibility for the establishment of noxious weeds in approximately 8 percent of the CEA (16,847 acres out of 223,213). Additional spread of noxious weeds by livestock in grazed areas is also likely to have occurred; however, this acreage cannot be quantified.

5.5.3.4 Fire Management

From 1980 through 2013, more than 1,200 acres of the CEA have burned in wildfires (WFDSS 2013). The majority of the vegetation in the CEA was historically classified as Fire Regime IV, which is characterized by 35- to 100+-year fire frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced). Low elevation shrub and perennial grass are cover types commonly associated with Fire Regime IV.

Many of the cover types near the Study Area have been subjected to wildland fire that is not within the historical range of variability (BLM 2008a). Large or uncharacteristic fires in these cover types can threaten people and property, as well as the resiliency, integrity, and long-term sustainability of ecosystem components and processes. Fires are occurring more frequently and are burning more severely in some cover types. For example, the invasion of the sagebrush steppe by invasive annual species, such as cheatgrass and medusahead wildrye, has substantially increased fine fuels in this cover type, making it more susceptible to large, frequent, and uncharacteristic fires. In other vegetation cover types, fires are occurring less frequently than they have historically, which causes undesirable changes in vegetation species composition and structure and an accumulation of hazardous fuels. For example, because of long-term fire suppression, juniper species are expanding their range at the expense of sagebrush steppe, and dry conifer cover types are slowly replacing aspen and some mountain shrub cover types (BLM 2008a). Within these vegetation types, prescribed burns have been used as a management tool for fuel management, which reduces the potential for wildfires.

Since approximately 1996, wildland fires have occurred in the region at an overall accelerated rate, mostly as a result of vegetation changes and changed conditions like cheatgrass invasion into sagebrush steppe cover types. To a lesser extent, the area has experienced decreases in fire frequency and attendant increases in fire severity in its aspen, dry conifer, and mountain shrub cover types. These vegetation cover types require more frequent disturbance to decrease fuel loads, facilitate aspen and forb regeneration, and decrease fire intensity. Altered fire regimes (changes in fire frequency, severity, and size) not only threaten resources, such as wildlife habitat, cultural resources, air/visual quality, and grazing, but also affect public and firefighter safety within and around areas of human development (BLM 2008a).

5.5.4 Foreseeable Future Activities

5.5.4.1 Vegetation

The reasonably foreseeable developments within the CEA that would affect vegetation include potential phosphate mining and transmission line development. This includes the reasonably foreseeable activities in **Table 5.1-2**, except for Smoky Canyon, which is outside of the vegetation CEA, plus 112 to 188 acres for the Hooper Springs Transmission Line (Bonneville Power Administration 2013). Together, these quantified reasonably foreseeable activities total 8,415 acres. Additional alteration and disturbance to vegetation from unquantifiable activities, such as livestock grazing, housing development, and conversion to cropland, is also expected to continue in the future.

Impacts related to vegetation containing selenium at historical phosphate mines in the CEA would be expected to continue until remedial action measures are completed. New phosphate mines are likely to incorporate BMPs and cover designs that limit potential for selenium uptake by vegetation, unlike past mines that were constructed without consideration for the potential of selenium release (IDEQ 2006).

5.5.4.2 Wetlands

Activities that may result in impacts to wetlands in the CEA, but cannot be quantified as a result of lack of data, include road maintenance, livestock grazing, and other activities, such as those conducted on private lands. There is also the possibility that future mining within the CEA would directly impact wetlands, though mitigation measures would likely be implemented to compensate for these impacts. Future indirect impacts to wetlands from sedimentation and selenium contamination are also possible, though BMPs would likely minimize these impacts as well.

5.5.4.3 Noxious Weeds

Foreseeable future ground-disturbing actions, such as phosphate mining, agriculture use, and livestock grazing, all carry the potential to increase noxious weeds in the CEA. Foreseeable actions that occur on federal land would include application of mitigation measures to reduce the introduction and spread of noxious weeds.

5.5.4.4 Fire Management

Alteration of vegetation through fire suppression and spread of invasive species would continue to alter fire regimes in the CEA in the foreseeable future. The Pocatello Field Office (PFO) Approved Resource Management Plan (ARMP) and CNF RFP provide management direction for fire and fuels within their areas of jurisdiction. These plans incorporate the National Fire Plan direction into existing land use plans by emphasizing the increased use of fire including prescribed burns and wildfires. This would approximate the historical role of fire and prepare sites for restoration treatments.

5.5.5 Cumulative Activities

5.5.5.1 Vegetation

The potential new disturbance to vegetation from the Proposed Action (406 acres) or RCA (391 acres), added to known past, present, and reasonably foreseeable future disturbances (16,847

acres of past/present disturbance and 8,415 acres of reasonably foreseeable disturbance, for a grand total of 25,262 acres) (**Table 5.5-1** and **Table 5.1-2**), results in approximately 11 percent of the CEA being disturbed (25,668 acres out of 223,213) for the Proposed Action and for the RCA (25,653 acres out of 223,213). The majority of this quantified disturbance is a result of phosphate mining, though it should be noted that an additional amount of unquantified disturbance to vegetation occurs in the CEA as a result of livestock grazing and other activities. Natural revegetation and reclamation would re-establish vegetation relatively quickly to most areas disturbed by mining, although the vegetation composition and community type would be changed and modified from its pre-disturbance state. Approximately 3 acres (approximately 0.001 percent of the CEA) of vegetation for the Proposed Action and approximately 14 acres of vegetation (approximately 0.006 percent of the CEA) would not be reclaimed and would remain barren over the long term, either as part of pit walls or part of the proposed county road realignment. In contrast to the Proposed Action, the RCA would reclaim an additional 30 acres of existing disturbed area that was approved to remain unreclaimed under P4's South Rasmussen Mine Reclamation Plan (P4 2015), which represents 0.01 percent of the CEA.

No site-wide increases of vegetation with selenium concentrations higher than action levels in the CEA are expected under the Proposed Action or the RCA, and no substantial contribution to cumulative effects would occur to vegetation in the CEA from this potential impact. Under either the Proposed Action or the RCA, seed mixes have been developed to avoid the use of selenium accumulator species. Therefore, there would be no corresponding cumulative effects of COPCs on vegetation from the Proposed Action or RCA.

5.5.5.2 Wetlands

In addition to past and present impacts, implementation of the Proposed Action would result in a maximum direct disturbance of approximately 20.5 acres of wetlands. This proposed wetland disturbance would be approximately 0.2 percent of the total wetlands in the CEA. The RCA would result in 0.3 acre of impact to wetlands and 0.000015 percent of the total wetlands in the CEA. These impacts would result in cumulative impact to wetlands when added to past, present, and reasonably foreseeable future disturbances to wetlands. The acres of wetland impact from the Proposed Action would require compensatory mitigation under the CWA administered by the U.S. Army Corps of Engineers (USACE). Due to the small size of wetlands impact, the RCA may or may not require compensatory mitigation under the CWA administered by the USACE. The type of mitigation for the impacts would be determined in consultation with the USACE. The Proposed Action would also result in indirect impacts to wetlands consisting of selenium and other COPCs into the waters downgradient of the mine. The RCA was designed to avoid most indirect impacts to wetlands.

5.5.5.3 Noxious Weeds

Adding the proposed disturbance to vegetation as a result of the Proposed Action (419 acres) or the RCA (391 acres) would increase the potential of cumulative effect of disturbed acres susceptible to noxious weed invasion within the CEA. However, as a result of the existing, limited establishment of noxious weeds in the Study Area and the weed prevention measures and control/treatment requirements that would be in place, contribution of noxious weeds by the Proposed Action or the RCA would be limited; therefore, the overall cumulative effect within the CEA would be limited as well.

5.5.5.4 Fire Management

Under the Proposed Action, approximately 83 acres of aspen forest would be removed and replaced with a grass-dominated vegetation community following reclamation. The RCA would

result in removal of 104 acres of aspen forest. This would replace less than 0.2 percent of the CEA that currently has an aspen fire regime (Fire Regime III) with a perennial grass fire regime (Fire Regime IV; Hardy et al. 2001; BLM 2008a). The fire frequency would be similar under the two fire regimes, but Fire Regime IV is characterized by more severe, stand-replacing fires (in which more than 75 percent of the dominant overstory vegetation is replaced). The shift from shrubland to grassland and eventual succession back to shrubland is not expected to alter the fire regime because Idaho shrublands below 7,500 feet in elevation and perennial grasslands are both classified as Fire Regime IV (BLM 2008a).

The replacement of 83 (under the Proposed Action) or 104 (under the RCA) acres of Fire Regime III area with Fire Regime IV area would impact less than 0.2 percent of the CEA for the Proposed Action or for the RCA. The disturbed land could also cumulatively add to the amount of land deviating from natural fire regimes if natural characteristics were altered by noxious weed invasions. Noxious weeds, especially cheatgrass, carry the potential to increase fire frequency and severity, which lowers the potential for native shrubs and bunchgrasses to established in disturbed areas (BLM 2008a). Monitoring and control measures for noxious weeds would be implemented under either the Proposed Action or the RCA, as described in the Environmental Management Plan (EMP; **Appendix A**).

5.5.6 Cumulative Effects

5.5.6.1 Vegetation

Although there are areas of historical reclamation with elevated selenium and other COPCs in the CEA, it is not expected that either the Proposed Action or the RCA would add to these areas or any impacts from vegetation with elevated COPCs. The thickness of the reclamation covers in the Proposed Action and the RCA would limit the amount of root mass that could or would be in contact with Meade Peak overburden thus preventing the accumulation of selenium over the 5 mg/kg action level in vegetation. The seed mixes used for reclamation were designed to avoid plants with tap roots that could contact the Meade Peak overburden. Thus, reclamation vegetation is not anticipated to accumulate COPCs; therefore, although there would be additional acreage of disturbed vegetation, it would not exacerbate any current issues with selenium in vegetation in the CEA. Future mines would likely incorporate closure practices and BMPs that would minimize selenium uptake as well. Additionally, as historical mine reclamation is remediated through the CERCLA process, the area of the overall acreage of reclamation vegetation with elevated COPCs may decrease.

Disturbance from either the Proposed Action or the RCA would include many temporary disturbances and would be short-term and minor. Over the long term, there would be only minor contributions to cumulative effects. Reclamation after mining would replace existing vegetation with grassland, which would then be subject to the process of succession. Unreclaimed areas (pit walls and the county road realignment) and removal of aspen forest (which is not expected to regenerate in reclaimed areas), totaling 72 acres for the Proposed Action and 104 acres for the RCA, would be a long-term, negligible cumulative impact affecting approximately 0.2 percent of the aspen in the CEA for the Proposed Action and 0.3 percent of the aspen in the CEA for the RCA. The overall vegetation cumulative effects with the addition of the Proposed Action or RCA would be long-term and minor.

5.5.6.2 Wetlands

The lost functions and values of the wetlands in the Study Area for the Proposed Action would be mitigated, resulting in a cumulative impact that is negligible and long-term. The RCA would

have little to no wetland affected; therefore, the cumulative impacts would be short-term and negligible.

Cumulative impacts due to sedimentation under the Proposed Action or the RCA are anticipated to be short-term and negligible if at all due the use of BMPs to control erosion at the mine. The Proposed Action would contribute to elevated COPC concentrations in downgradient wetlands in the Upper Blackfoot River watershed. The addition of the elevated COPCs would be a long-term, negligible cumulative impact as a result of the predicted low incremental increases in COPCs in surface waters in the CEA. The RCA eliminates the associated potential for releases of COPCs to wetlands.

5.5.6.3 Noxious Weeds

Disturbed lands are more susceptible to weed infestations; however, invasive species monitoring and control measures would be implemented under either the Proposed Action or RCA, as discussed in the EMP (**Appendix A**). These control measures, together with ongoing county, state, and federal weed control efforts being conducted across the CEA, would help minimize cumulative impacts of noxious weeds over the long term. Overall, cumulative effects of noxious weeds for the Proposed Action or the RCA would be long-term and negligible.

5.5.6.4 Fire Management

Because of the small area involved, the long-term cumulative effects of the altered fire regimes under the Proposed Action or the RCA would be negligible. Under both alternatives, the majority of disturbed areas would be revegetated with native plant species, and invasive plant species would be controlled as necessary. These measures would help ensure that the site was restored to the baseline fire regime over the long term, thereby minimizing cumulative effects.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no new effects to vegetation, riparian areas, and wetlands.

5.6 TERRESTRIAL WILDLIFE

5.6.1 CEA Boundary

The CEA for terrestrial wildlife (**Figure 5.6-1**) includes suitable habitat for species of concern within a 15-mile radius of the Study Area. This area includes public lands administered by the USFS, the BLM, and the State of Idaho. There are no federally designated wild and scenic rivers, wilderness areas, Areas of Critical Environmental Concern (ACECs), or Research Natural Areas (RNAs) within this CEA. The state-administered Blackfoot River Wildlife Management Area (WMA) is located at the south end of the Study Area. The CEA includes the area affected by past, present, and reasonably foreseeable future development activities within this area. The cumulative effects of habitat fragmentation from development on wildlife populations and habitats at and around the mine are a concern.

Most impacts to wildlife would occur within or immediately adjacent to the Study Area and would affect individuals with home ranges overlapping with or immediately adjacent to the Study Area. An area with a 15-mile radius is large enough to encompass the home ranges of the most mobile wildlife individuals in the Study Area, such as large predatory mammals. The home ranges of small and less mobile individuals would be found well within this range. It is unknown to what extent larger, more mobile wildlife would be displaced and what the impacts of

displacement on resident populations would be; however, given the scale of the Proposed Action or the RCA, it is unlikely that any short- or long-term adverse impacts to wildlife species would occur beyond the identified CEA.

5.6.2 Introduction

GAP landcover data (USGS 2001) were used to quantify habitat types in the CEA, as this data source focuses on habitat identification, provides habitat categories similar to those delineated in site-specific baseline studies (BC 2012a), and covers the entire 15-mile radius CEA. According to GAP landcover data (USGS 2001), sagebrush, coniferous forest, aspen forest, and wetland/riparian areas are the dominant wildlife habitat types within the CEA (**Table 5.6-1**). Other native habitats (including grassland, open water, and other types of shrubland) are present throughout the CEA in smaller quantities. This diversity in habitat types allows for many wildlife species, including a wide variety of mammals and birds, to utilize the area.

Table 5.6-1 Existing Land Cover in Wildlife CEA

Cover Type	Acres	Percentage
Sagebrush Shrubland	189,462	33.6
Coniferous Forest	137,617	24.4
Aspen Forest	80,598	14.3
Wetland/Riparian	80,238	14.2
Cropland	31,260	5.5
Grassland	17,113	3.0
Open Water	10,110	1.8
Other Shrubland	6,511	1.2
Developed	4,777	0.8
Harvested Forest	2,504	0.4
Pasture	1,837	0.3
Quarries, Mines, Gravel Pits, Oil Wells	1,348	0.2
Introduced Grassland	10	0.0
Total	**563,385**	**100.0**

Source: USGS 2001

According to preliminary IDFG data (Wackenhut 2014) and the CNF RFP (USFS 2003b), elk and moose winter range, mule deer summer range, and some elk parturition areas occur in the wildlife CEA. Other mammals in the wildlife CEA include small herbivores (e.g., rabbits), omnivores (e.g., rodents), bats, and medium- to large-sized carnivores (red fox and coyote). There are several species of upland game birds found in the wildlife CEA including ruffed grouse, greater sage-grouse, Columbian sharp-tailed grouse, and dusky grouse. Greater sage-grouse cumulative effects are discussed in **Section 5.8**. Habitat for migratory birds occurs throughout the wildlife CEA and includes every listed cover type. Suitable habitat for nesting and foraging raptors occurs throughout the wildlife CEA. According to the USGS (USGS 2001), there are about 10,000 acres of open water habitats in the CEA. These open water habitats may be used by a wide variety of water birds for foraging, brood-rearing, and nesting.

5.6.3 Past and Present Activities

Within the CEA, quantified past and present disturbances based on the GAP landcover data (USGS 2001) have resulted from agriculture (cropland and pasture; 33,097 acres); roads,

buildings, and other development (4,777 acres); timber harvests (2,504 acres); and quarries, mines, gravel pits, and oil wells (1,348 acres; **Table 5.6-1**). A different dataset for mining activity in the CEA indicates that approximately 9,943 acres have been disturbed by mining (primarily from historical phosphate mining activity shown in **Figure 5.1-1**; Causey and Moyle 2001). There are an additional 6,775 acres of agency-approved mining disturbance in the wildlife CEA (**Table 5.1-2**) for a total of 16,718 acres of historical and present phosphate mine disturbance in the CEA. However, much of this area has been reclaimed and supports grassland and shrubland wildlife habitat.

Wildfires have disturbed more than 3,800 acres in the CEA since 1980 (WFDSS 2013). Range allotments, which have affected vegetation through grazing, occur on more than 91,000 acres (16 percent) of the CEA, but it is not possible to quantify the extent of grazing impacts to wildlife habitat.

Additional unquantified past and present activities in the CEA that may affect wildlife include residential and commercial development; vegetation management activities on private lands; roads; power lines; and recreational uses such as hunting, fishing, ATV and snowmobile use, camping, and picnicking.

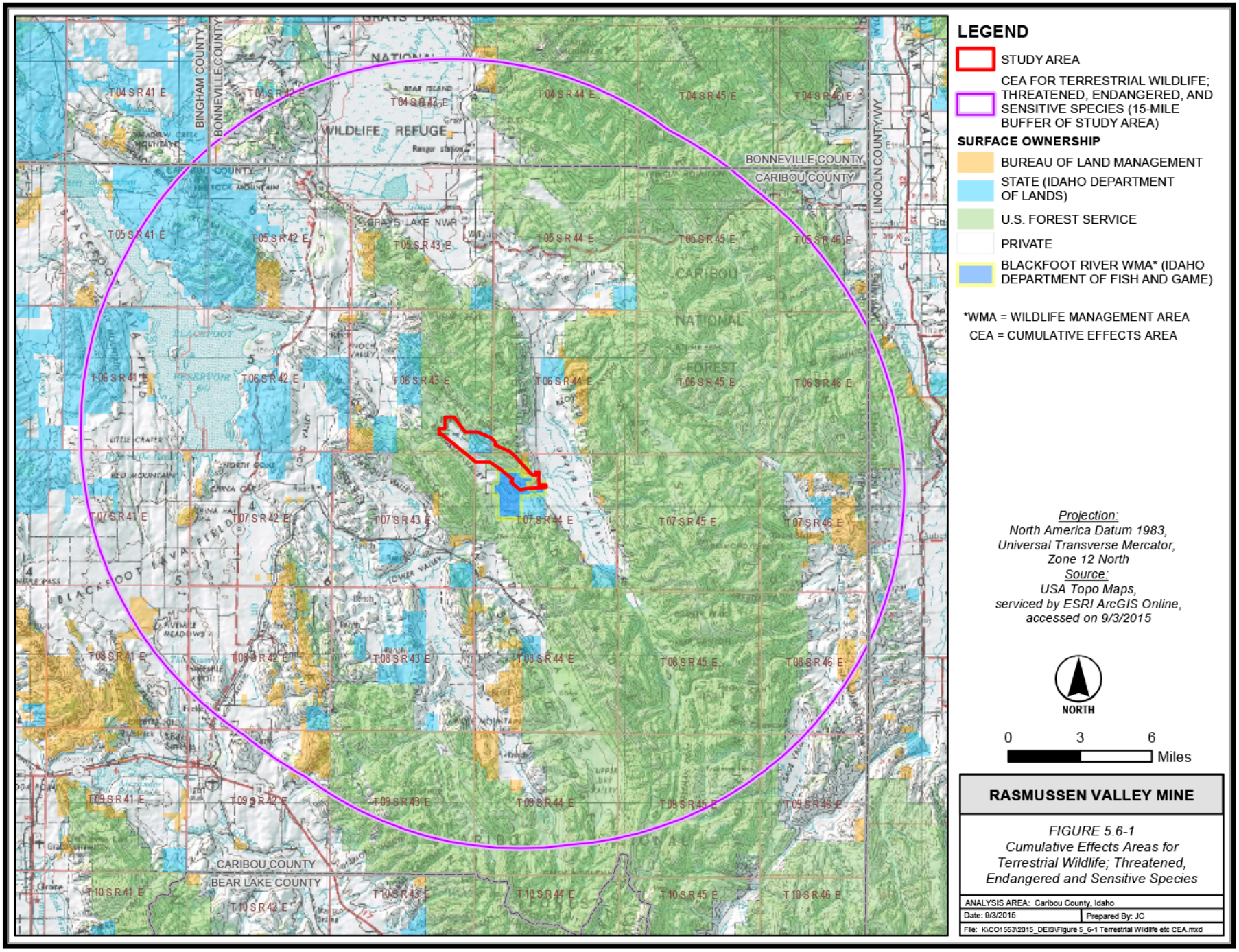
5.6.4 Foreseeable Future Activities

Specific future land impacts on private lands in the CEA are difficult to quantify as a result of lack of data, but would be an area smaller than the private land ownership area. Past and present actions on private land within the CEA have mainly included mining, agriculture, and grazing activities, and these are anticipated to continue in the future. Occasional instances of housing development have also occurred on the large ranches within the CEA, and this is also anticipated to continue.

Table 5.1-2 lists foreseeable future mining activities, the only quantified proposed activities on public land that could impact wildlife habitat throughout the wildlife CEA. These quantified foreseeable future disturbances total 8,242 acres (**Table 5.1-2**). The Hooper Springs Power Line will impact an additional 112 to 188 acres in the foreseeable future (Bonneville Power Administration 2013), for a total of up to 8,430 acres of quantified reasonably foreseeable disturbance to wildlife habitat.

5.6.5 Cumulative Activities

The foremost impact to wildlife within the CEA has been and will continue to be habitat changes associated with development, mining, agriculture, grazing, and timber harvest. Based on GAP landcover data (USGS 2001), quantified past disturbance to wildlife habitat measures approximately 41,726 acres or 7 percent of the CEA. A different dataset for mining activity in the CEA indicates that approximately 9,943 acres have been disturbed by historical mining (primarily from phosphate mining activity shown in **Figure 5.1-1**; Causey and Moyle 2001). There are an additional 6,775 acres of agency-approved mining disturbance in the wildlife CEA (**Table 5.1-2**) for a total of 16,718 acres of historical and present phosphate mine disturbance in the CEA. Including these acres raises the past disturbance in the CEA to 58,444 acres or 10 percent of the CEA.


LEGEND
STUDY AREA
CEA FOR TERRESTRIAL WILDLIFE; THREATENED, ENDANGERED, AND SENSITIVE SPECIES (15-MILE BUFFER OF STUDY AREA)
SURFACE OWNERSHIP
BUREAU OF LAND MANAGEMENT
STATE (IDAHO DEPARTMENT OF LANDS)
U.S. FOREST SERVICE
PRIVATE
BLACKFOOT RIVER WMA* (IDAHO DEPARTMENT OF FISH AND GAME)
*WMA = WILDLIFE MANAGEMENT AREA
CEA = CUMULATIVE EFFECTS AREA
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps,
serviced by ESRI ArcGIS Online,
accessed on 9/3/2015
NORTH
0 3 6
Miles
RASMUSSEN VALLEY MINE
FIGURE 5.6-1
Cumulative Effects Areas for Terrestrial Wildlife; Threatened, Endangered and Sensitive Species
ANALYSIS AREA: Caribou County, Idaho
Date: 9/3/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Figure 5_6-1 Terrestrial Wildlife etc CEA.mxd
WILDLIFE REFUGE
BONNEVILLE COUNTY
CARIBOU COUNTY
BINGHAM COUNTY
LINCOLN COUNTY WY
CARIBOU NATIONAL FOREST
BEAR LAKE COUNTY

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The reasonably foreseeable future disturbances quantified in **Table 5.1-2**, with the addition of the Hooper Springs Power Line, total 8,430 acres. When added to the past and present disturbances, these future disturbances would increase the disturbance of lands in the CEA to about 12 percent (approximately 66,874 acres disturbed out of 563,385 total acres). Adding the potential new disturbance of the Proposed Action (419 acres) or the RCA (391 acres) to that total increases the overall percent of disturbance by less than 0.1 percent, a negligible amount relative to the size of the CEA.

5.6.6 Cumulative Effects

The cumulative activities within the CEA may have a wide array of effects on wildlife. Some types of activities, such as timber harvest, vegetation treatments, and fires, may be beneficial for wildlife species that utilize forest openings or early seral stages. The majority of habitat conversion from timber harvest is in the form of forest removal followed by reforestation with a short period of early seral (non-climax grass or shrub) conditions. This habitat conversion would cause forest-dependent wildlife using the affected areas to disperse in search of new areas. In contrast, most wildfires in the CEA have affected the scrub/shrub (largely sagebrush) vegetation type. The flush of new vegetation growth following a fire may provide a beneficial food source for wildlife such as big game. Once active mining had ceased under the Proposed Action or RCA, the newly reclaimed area may likewise benefit wildlife through new growth of a variety of native forbs and grasses that could provide forage for a number of species.

Negative impacts to wildlife within the CEA include loss of habitat; displacement; and fragmentation as a result of fires, mining, timber harvesting, roads, private land development, agriculture, and recreation. Other impacts that are not quantified include the effects of noise on wildlife, habitat fragmentation, and displacement from mining, roads, and recreational activities. Additionally, small, less mobile wildlife (such as small mammals and reptiles that cannot relocate outside of disturbance areas) are subject to direct mortality and localized population reductions from ground-disturbing activities.

In general, displacement of larger, more mobile wildlife from habitat disturbance decreases survival rates of affected individuals to some degree and increases competition. Mine construction and operation could temporarily cause some wildlife, such as big game, carnivores, and raptors (which generally prefer areas free from anthropogenic noise and activity), to avoid the portion of the CEA close to mining. Implementing the Proposed Action or RCA would result in the displacement of mobile wildlife from the Study Area and the surrounding habitat into adjacent undisturbed areas, where competition in already-occupied habitats may increase. Displacement carries the potential to result in a minor cumulative impact to mobile wildlife for the duration of the Proposed Action or the RCA. Overall, the Proposed Action would cause more cumulative displacement and habitat loss in wetland, riparian, and sagebrush habitats, whereas the RCA would cause more cumulative displacement and habitat loss in aspen forest and high-elevation rangeland habitats.

Past and present disturbances from roads and mining activities have resulted in fragmentation of certain wildlife populations and their habitats. While larger, more mobile species may be able to traverse or route around mines, small, relatively immobile animals (such as reptiles and small mammals) may be subject to isolation as formerly contiguous habitats are disturbed by features such as roads and mines. These types of features may also increase the amount of “edge” in formerly contiguous habitats, decreasing habitat quality for species such as some small breeding birds (Paton 1994; Baker and Dillon 2000, Rufenacht and Knight 2000; Fahrig 2003). Fragmentation effects within the CEA have not been quantified by the land management

agencies. Implementing the Proposed Action would result in additional fragmentation to wildlife habitat and could isolate populations of small, immobile wildlife. However, this impact would be minor, as the habitats in the Study Area and surrounding landscape are naturally patchy. Thus, a minor cumulative effect to wildlife from fragmentation impacts would potentially occur for the duration of the Proposed Action. The cumulative effects of habitat fragmentation under the RCA would be reduced relative to the Proposed Action because the RCA would consolidate some disturbance (including the main haul road) in already disturbed areas.

Wildlife may be subject to direct mortality from a variety of sources including trampling by livestock and collisions with vehicles, fences, and power lines, but these effects are not quantifiable. The Proposed Action would contribute to cumulative effects of power lines in the CEA because it would include installation of an overhead power line that would pose a mortality risk to birds and provide a potential perching substrate for avian predators. This risk would not exist under the RCA. Both alternatives could cumulatively contribute to wildlife mortality through vehicle collisions along the haul road during active mining.

Many game species are hunted within the CEA. Human presence in the form of recreation may disturb many species of wildlife. Human disturbance during periods of the year when wildlife are otherwise stressed (such as during the winter) can further stress wildlife and affect their survivorship. Wintering big game may be subject to harassment by recreationists, particularly if available hiding and escape cover is reduced by other activities. Both alternatives would cumulatively contribute to displacement and stress on wintering big game. Under the Proposed Action, there would be 47 acres of direct disturbance to elk and deer winter range and under the RCA there would be 70 acres of direct disturbance to elk and deer winter range (based on USFS [2003] mapping).

Wildlife are affected by livestock grazing as a result of competition for forage, direct mortality by trampling (e.g., small mammals, reptiles, and amphibians), and alteration of plant communities. As described in the Canada Lynx Conservation Assessment Strategy (Interagency Lynx Biology Team 2013), both domestic livestock and wildlife ungulate grazing may change the structure or composition of native plant communities. Proper rotation and stocking rates can minimize these effects. Livestock grazing on the CNF is conducted in compliance with standards and guidelines contained in the CNF RFP (USFS 2003b), and livestock grazing on BLM lands is conducted in compliance with the PFO ARMP (BLM 2012). Grazing conducted in compliance with agency management guidance is expected to have minimal impacts on wildlife and their habitat. Neither alternative would change native rangeland plant communities over the long term because 96 to 99 percent of the disturbance (depending on the alternative) would be reclaimed within native grass, forb, and shrub species. Once reclaimed, each alternative would allow for grazing similar to baseline conditions.

Noxious weed invasions are another source of unquantified wildlife impacts in the CEA. Noxious weeds can affect wildlife habitat by displacing native plant species and altering fire regimes. Wildfires in sagebrush may result in the establishment of cheatgrass, which establishes quickly after fire and excludes native perennials, reducing habitat for sagebrush-dependent species (Zouhar 2003). Each alternative would increase the potential for noxious weed invasion in the Study Area. However, BMPs would be implemented to minimize the potential for cumulative effects of noxious weeds (BMPs that would minimize noxious weed impacts include keeping mining disturbances to a minimum for as short a timeframe as possible, with overburden areas and pit backfill advancing in concert with the active pit; monitoring and controlling noxious weed infestations; using certified weed-free seed, mulch, and straw bales; and developing and implementing an annual noxious weed treatment plan).

All species are potentially vulnerable to the toxic effects of selenium accumulation. Other nearby phosphate mines exhibit increased concentrations of selenium and other metals in water, aquatic plants, aquatic invertebrates, and fish near the Study Area (Hamilton and Buhl 2003). Increasing concentrations of selenium in surface water and groundwater seeps and springs may lead to reduced reproductive success in certain terrestrial wildlife of the region. Selenium contamination is expected to continue below operating and reclaimed phosphate mines in the foreseeable future. New phosphate mines are likely to incorporate BMPs that limit the potential for selenium contamination of the environment, unlike past mines that were constructed without regard for selenium contamination (IDEQ 2006).

Big game foraging on reclaimed mine overburden piles in the wildlife CEA have been exposed to elevated levels of selenium. One past study found selenium levels as high as 13.06 mg/kg in elk liver and 0.92 mg/kg in elk muscle tissue. The level found in elk liver was high enough for the Idaho Bureau of Community and Environmental Health to advise people to avoid eating elk liver in large quantities from elk harvested on historical phosphate mine areas (BCEH 2006).

Two studies completed in the southeastern Idaho phosphate region suggest that increased selenium from mining has not affected bird populations or reproductive success at the population level (Skorupa et al. 2002; Ratti et al .2006). Skorupa et al. (2002) revealed higher than normal selenium concentrations (> 3 µg/g) in bird eggs at all six southeastern Idaho mine sites where sampling took place. The authors assessed 39 bird embryos from the 74 eggs collected in the study and found two embryos with abnormalities that were possibly, though not definitively, linked to selenium poisoning. The authors also performed a risk assessment for the sampled eggs and calculated an 8 percent risk of deformities, which when added to the rate of non-deformed embryo loss, equates to a predicted 40 to 50 percent rate of individual embryo loss in the sampling region because many embryos also die without exhibiting deformities (Skorupa et al. 2002). The overall risk at the population level depends not only on the level of selenium contamination, but also on the attractiveness of the site to breeding birds. Therefore, the authors concluded that "high potential for risk did not seem to be realized on a large scale as a result of the relative scarcity of breeding water birds at most sites surveyed" (Skorupa et al. 2002). However, the authors caution that there could be many sites in the phosphoria region that have not been assessed for breeding bird use, and that further sampling may reveal higher levels of risk (Skorupa et al. 2002).

In 1999 and 2000, Ratti et al. (2006) tested selenium levels in 544 bird eggs from mine and reference sites in southeastern Idaho, and in 2001 the authors monitored the nest success of 623 American robin and red-winged blackbird nests at these sites. The authors concluded, "on a population level, American robin and red-winged blackbird reproductive success in southeastern Idaho was not impaired by existing levels of selenium in avian eggs. Based on our multi-species data and more-specific data on American robins and red-winged blackbirds, we conclude that there are no negative effects on reproductive success of the general avian community at this time." The authors also acknowledge that negative effects may be occurring in some bird species immediately adjacent to mine sites, where high selenium concentrations (>10 µg/g) were observed in eggs (Ratti et al. 2006). Selenium exposure for some groups of wildlife, such as bats and game birds, has not been studied in the CEA under the Proposed Action or RCA, wildlife may be exposed to selenium through uptake and accumulation of selenium in wetland and riparian vegetation and percolation of selenium and other COPCs into surface water. Under the Proposed Action or RCA, risk of selenium exposure from vegetation growing on the reclaimed site is anticipated to be negligible in the context of the CEA as a whole as a result of the relatively small area that would be reclaimed, the use of a deep cover, and because seed mixes have been developed to encourage uptake of water from the upper soil horizon and avoid the use of selenium accumulator species.

Wildlife drinking from surface waters fed by groundwater downgradient of the Proposed Action could be exposed to elevated concentrations of selenium, manganese, cadmium, zinc, and nickel under the Proposed Action. However, increases in COPCs in surface waters would be negligible, and exposure to COPCs through drinking water is considered less of a risk to wildlife than exposure via bioaccumulation through the food chain (ITRC 2011). Wildlife species that eat aquatic insects, plants, and fish, and those that prey upon species consuming these foods may be at risk of toxicity associated with exposure to COPCs within and around the Study Area. The direct and indirect effects of COPC exposure under the Proposed Action would be long-term and negligible to minor, depending on a variety of factors including the susceptibility of the species and the degree to which the species preys on aquatic food sources. The additional cumulative effect of the Proposed Action on the CEA would be long-term and negligible. This risk would be low as a result of the expected low increases in COPC concentrations in surface waters. In contrast to the Proposed Action, the RCA would not result in measureable increases of COPCs in surface waters and therefore would not have COPC-related cumulative effects. Relative to the Proposed Action, the RCA would carry a lower potential to contribute COPCs to the watershed; therefore, the cumulative effects under this alternative would be reduced.

Of the two alternatives, the Proposed Action would have greater overall cumulative effects on wildlife because it would result in a greater residual debit in wildlife habitat services, based on the Habitat Equivalency Analysis (HEA; residual debit of 3,207 residual discounted service area years [DSAYs] versus 2,242 under the RCA). The Proposed Action would have greater cumulative effects on wildlife species that use wetland and riparian areas and sagebrush habitats, whereas the RCA would have greater cumulative effects on wildlife species that use aspen forest and high-elevation rangeland habitats. Cumulative effects of habitat fragmentation and power line collision would be lower under the RCA than under the Proposed Action.

In summary, adding the Proposed Action or the RCA disturbances to past, present, and foreseeable future disturbances would result in short- and long-term, negligible cumulative effects to wildlife. Cumulative effects would be reduced to some extent due to the BLM's policy of requiring that an HEA be conducted for this and other phosphate mines in the future in order to quantify impacts to upland wildlife habitats and provide a mechanism by which proponents can tailor voluntary mitigation projects to offset or partially offset the wildlife habitat services debit. Use of the HEA to quantify impacts provides more certainty that mitigation actually replaces some or all of the impacted habitat services. By performing mitigation projects (or providing funding to perform mitigation projects) within the CEA, future mines across the region can neutralize their impact (although mitigation is voluntary, and not all proponents may choose to do so). Agrium has chosen to provide a mitigation plan for the Rasmussen Valley Mine, and in implementing the mitigation, will reduce the cumulative impact of the project.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no cumulative effects to terrestrial wildlife.

5.7 FISHERIES AND AQUATIC RESOURCES

5.7.1 CEA Boundary

The CEA for fisheries and aquatic resources encompasses the Upper Blackfoot River Watershed (HUC 1704020702) and Lanes Creek-Diamond Creek Watershed (HUC 1704020701) from the headwaters of Lanes Creek to the Blackfoot Reservoir about 10 miles to the west. The CEA encompasses approximately 223,389 acres within the eastern portion of the

Blackfoot Sub-basin (HUC 17040207) that may be affected by the Proposed Action and other existing and reasonably foreseeable future projects. CEA boundaries, as well as locations of past and present mining activities, are depicted on **Figure 5.3-1**.

5.7.2 Introduction

Fisheries and aquatic resources are affected by surface water quality, which is discussed above in **Section 5.3**. Activities or phenomena affecting water resources within the CEA, and consequently fisheries and aquatic habitat, include mining; farming; ranching; livestock grazing; wildfires; fire suppression activities; road building; and development of domestic, commercial, and industrial land parcels. These activities, particularly mining, can increase the mobilization of selenium, other COPCs, and sediments. Many of these activities also affect the volume and timing of surface runoff, directly altering aquatic habitat. Cumulative effects to fisheries and aquatic resources may include changes in concentrations of selenium and other COPCs, and changes in sediment load in waterways.

5.7.3 Past and Present Activities

Past activities within the CEA that have impacted fisheries and aquatic resources include livestock grazing, agriculture, vegetation management, road construction, and phosphate mining. Acres of disturbance in the CEA associated with most of these activities are shown in **Table 5.1-1** and **Table 5.5-1**. Activities taking place within the aquatic influence zone (AIZ) have removed or altered riparian vegetation, which has contributed to the degradation of instream habitat.

The IDEQ assessed approximately 85 miles of the Blackfoot River and its tributaries between 1997 and 2000. The agency determined that, along portions of the river, the Blackfoot River's beneficial uses (coldwater aquatic life, salmonid spawning, recreation, domestic water supply, agricultural water supply, industrial water supply, wildlife habitat, and aesthetics) are impaired by sediment, nutrients, organics, and unknown pollutants (IDEQ 2006).

Sedimentation can reduce the foraging and reproductive success of some species of macroinvertebrates, disrupt fish migration, and impair the respiratory systems and gills of macroinvertebrates and fish. Species composition and numbers of macroinvertebrates can be altered by increased sedimentation and resultant habitat changes (Waters 1995). In the CEA, possible causes of sedimentation have included agriculture, grazing, and road construction.

Approximately 93 percent of the BLM Pocatello Field Office planning area is open to grazing by either cattle or sheep (BLM 2006). Grazing allotments occur on approximately 33,618 acres in the CEA (BLM 2008b). Livestock grazing in AIZs and riparian areas can increase sediment load to watersheds through increased instream trampling, increased disturbance and erosion from overgrazed streambanks, reduced sediment trapping by riparian and instream vegetation, decreased bank stability, and increased peak flows from compaction (Waters 1995).

Road construction has also impacted streams and wetlands in the CEA. Roads can disrupt the natural hydrology of watersheds by concentrating runoff, which is then directed to streams at higher flow rates, leading to widening or deepening of channels. Such changes in flow rate and stream morphology can negatively impact some species and benefit others, leading to shifts in community composition. Second, use of roads can lead to sedimentation of water bodies by contributing to erosion. Third, unless culverts are properly placed and maintained, roads can create barriers to stream flow and alter stream hydrology, isolating populations of aquatic organisms (Gucinski et al. 2001).

Agricultural practices, such as over-application of fertilizer and manure, can also affect streams and wetlands through phosphorous pollution. Runoff containing high concentrations of phosphorous can enter streams, leading to the increased growth of algae and aquatic weeds and subsequent oxygen shortages. Mortality of fish and aquatic macroinvertebrates may occur as a result (Sharpley et al. 2003).

Other nearby phosphate mines have increased selenium and other metal concentrations in groundwater and surface water in the area watersheds including the Blackfoot River. In 2014, the USGS released a report summarizing more than a decade of data on selenium levels in streams across the Upper Blackfoot River Watershed (Mebane et al. 2015). This study reported selenium concentrations across the watershed that exceeded the State of Idaho CCC concentration of 5 μg/L, especially during spring runoff (however, data from more recent years [2013 and 2014] suggest a lower level of impact [USGS 2015]).

In general, reproductive effects may be observed in fish if selenium concentrations in fish eggs exceed the recommended toxicity threshold of 10 mg selenium/kg egg tissue (Lemly 1997). The Lemly (1997) threshold was developed using data for bass, sunfish, and minnows, though it can be applied to all species. Hamilton and Buhl (2003) extrapolated fish egg selenium concentrations from fish whole-body selenium concentrations and found values exceeding 10 mg/kg at several sites in and around the CEA.

Rudolph et al. (2008) studied cutthroat trout and determined the no-effect threshold selenium concentration in eggs to be >20.6 mg/kg dry weight. This threshold has likely been exceeded in the CEA based on the relationship that they observed between fish muscle tissue concentration and fish egg concentration. If the Rudolph et al. (2008) relationship between percent fry mortality and egg selenium concentration holds true for the Blackfoot River, then fry mortality in the river is approximately 19.6 percent (based on an average fish tissue selenium concentration of 16 mg/kg).

NewFields (2009) investigated selenium toxicity in wild brown trout collected from waters downstream of the Smoky Canyon phosphate mine. The results of this study confirm the results of the Rudolph et al. (2008) study. There were positive correlations observed between egg selenium concentration and mortality, and between egg selenium concentration and incidence of deformities. The NewFields (2009) study also provides further evidence that selenium-related mortalities and deformities are likely already occurring in the CEA. In contrast, Hardy et al. (2009) did not observe toxicity and reproductive impairment to growing cutthroat trout exposed to up to 10 μg/g of dietary selenium.

Van Kirk and Hill (2007) modeled population-level responses of Yellowstone cutthroat trout to selenium toxicity. The authors' model predicted a rapid decline in the trout population at elevated selenium levels, with a 90 percent decrease from carrying capacity at a whole-body selenium concentration of about 17 μg/g. After the rapid initial decline, the model predicted that the population would stabilize at a much lower number of individuals (Van Kirk and Hill 2007). The results of this study suggest that past and present activities in the CEA may have reduced fish populations to below carrying capacity. Natural history factors, such as migration, immigration or emigration of fish, competition between fish species, and food sources, are also important when determining whether patterns observed in fish populations are selenium-related (Canton and Baker 2008).

Many species of amphibians and reptiles are potentially found within the fisheries and aquatics CEA. As a whole, they use every habitat type, from wetland to dry sagebrush to forest.

Amphibians and reptiles are small and fairly immobile, and habitat fragmentation and mortality have occurred as a result of road-building and other construction projects, grazing, mining, vegetation management, conversion of land to agriculture, and wildfire.

Amphibians and reptiles residing in aquatic habitats are vulnerable to degradation of water quality and aquatic prey; these species have likely been affected by activities in the CEA causing sedimentation or contamination of streams and wetlands. Effects to amphibians and reptiles from elevated selenium concentrations have not been evaluated within the CEA, but studies have found elevated selenium levels in water, sediment, aquatic plants, and aquatic insects downstream of reclaimed phosphate mines (Hamilton and Buhl 2003). Also, selenium poisoning has been confirmed in many salamanders at the nearby Gay Mine and the Smoky Canyon Mine. Concentrations in some individuals were 10 to 100 times the normal level in animal tissue (BLM 2003b). It seems likely, therefore, that amphibians and semi-aquatic reptiles have been affected by elevated selenium levels within the CEA.

5.7.4 Foreseeable Future Activities

The practices that have affected aquatic resources in the CEA in the past would be expected to continue into the foreseeable future. Reasonably foreseeable actions, including maximum acres of potential future phosphate mines in the CEA, are described in **Section 5.5**. Enforcement of water quality standards and the incorporation of BMPs into future projects would be expected to lessen impacts on aquatic resources in comparison to past projects that were implemented with less regard for impacts to aquatic resources (IDEQ 2006). Remediation of inactive or abandoned mine properties is ongoing or planned to reduce existing and future selenium and COPC release to groundwater and surface water resources in the Blackfoot River basin, thereby reducing the load and impacts from COPCs to the river. Remedial actions are currently underway at the South Maybe Canyon, Conda/Woodall, and Smoky Canyon Mines, and only two of 17 historical mines in the region remain to initiate remedial investigation and possible cleanup activities. These two are the FMC Dry Valley and Rhodia Wooley Valley Mines.

5.7.5 Cumulative Activities

The Proposed Action would add the direct loss of approximately 20.5 acres of wetland and riparian habitat and 80 acres of AIZ to the amount of overall disturbance to aquatic habitats in the CEA. However, mitigation measures would be implemented to offset the lost functions and values of the impacted wetlands, per the requirements of the CWA. Implementation of BMPs and a Water Management Plan would control discharges of sediment to surrounding waters; therefore, the Proposed Action would not be expected to substantially add to the effects of sedimentation in the CEA.

The RCA would result in the direct loss of approximately 0.3 acre of wetland and riparian habitat and 11 acres of AIZ, which would contribute a negligible amount of disturbance to aquatic habitat in the CEA. Similar to the Proposed Action, the RCA would also incorporate BMPs and a Water Management Plan to minimize impacts.

Under the Proposed Action, cumulative effects of COPCs on macroinvertebrates, fish, and amphibians are possible, as there would be measurable loading of selenium, zinc, manganese, and nickel to Angus Creek and the Blackfoot River. Although, as discussed in **Section 4.7.1.1.3**, population-level effects on macroinvertebrate, fish, or amphibian populations are unlikely under the Proposed Action, the exact degree to which effects would occur is uncertain, and minor cumulative effects on the aquatic food web are possible. Potential cumulative effects

include an increase in the prevalence of fish deformities and mortalities, as well as toxicity to some macroinvertebrates and amphibians, even though the average overall fish body burden may remain below the USEPA draft freshwater chronic criterion of 8.0 µg/g (USEPA 2015a). Given the wide array of past, present, and foreseeable future projects, including other mines, affecting aquatic resources in the CEA, and the widespread nature of those projects, it is difficult to predict with certainty the extent to which the additive effects of the Proposed Action would raise water or tissue concentrations of selenium above established protective criteria. As part of its EMP (**Appendix A**), Agrium would monitor surface water quality downgradient of the mine and, if mining-related impacts to water quality were detected, Agrium may conduct further sampling (which may include further macroinvertebrate and fish sampling) as necessary to further assess impacts.

In contrast to the Proposed Action, the RCA would not result in measurable loading of COPCs to surface waters; therefore, these cumulative effects would not occur under the RCA.

5.7.6 Cumulative Effects

Under the Proposed Action, cumulative effects to aquatic habitat resulting from direct disturbance to 20.5 acres of wetlands and 80 acres of AIZ would be long-term and minor, totaling 0.05 percent of the CEA. Cumulative effects to aquatic resources resulting from increased concentrations of selenium and other COPCs downgradient of the Study Area would also be long-term and minor. Direct loss of aquatic habitat and sedimentation would be controlled and mitigated as described in **Section 4.7.4**, and COPC releases would be addressed through implementation of the EMP (**Appendix A**). Overall, the Proposed Action would have minor cumulative effects on aquatic resources, including aquatic habitat, macroinvertebrates, fish, and amphibians and reptiles, when combined with other past, present, and reasonably foreseeable activities in the CEA.

The RCA was designed to avoid most direct impacts to aquatic habitat, except for 0.3 acre of direct disturbance to seasonal mountain drainages and 11 acres of direct disturbance to the AIZ. In the context of the overall CEA, these direct impacts would be negligible, totaling less than 0.01 percent of the CEA. Because the RCA would directly impact less aquatic habitat and AIZ, cumulative impacts on macroinvertebrates, fish, and amphibians and reptiles would also be lower in magnitude than under the Proposed Action.

The RCA would also not directly impact fish-bearing streams or result in measureable loading of selenium or other COPCs to surface waters. For these reasons, cumulative effects to aquatic resources, including aquatic habitat, macroinvertebrates, fish, and amphibians and reptiles, would be negligible.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no cumulative effects to fisheries and aquatic species.

5.8 THREATENED, ENDANGERED, OR SENSITIVE SPECIES

5.8.1 CEA Boundary

The CEA for threatened, endangered, or sensitive species encompasses that area affected by past, present, and reasonably foreseeable future development activities at the Rasmussen Valley Mine and includes suitable habitat for species of concern within a 15-mile radius of the Study Area (**Figure 5.6-1**).

Most impacts to threatened, endangered, or sensitive species would occur within or immediately adjacent to the Study Area and would affect individuals with home ranges overlapping or immediately adjacent to the Study Area. An area with a 15-mile radius is large enough to encompass the home ranges of the most mobile wildlife individuals in the Study Area. It is unknown to what extent wildlife individuals would be displaced and what the impacts of displacement on resident populations would be; however, given the scale of the Proposed Action or the RCA, it is unlikely that any short- or long-term adverse impacts to BLM and USFS special status species would occur beyond the identified CEA.

5.8.2 Introduction

The Canada lynx and greater sage-grouse are the only federally listed species or candidates to potentially occur in or near the Study Area and therefore are the only federally listed or candidate species that could be subject to cumulative effects analysis. Several USFS Management Indicator Species and BLM sensitive species potentially occur with the Study Area and are listed in **Table 3.8-1**. A variety of habitats for these special status species occur in the CEA (**Table 5.6-1**).

5.8.3 Past and Present Activities

The primary past and present activities affecting Canada lynx in the CEA are long, linear anthropogenic structures and large areas of human-altered land cover that have created barriers to lynx movement through the linkage area. The primary anthropogenic barriers to lynx movement in the CEA include the Union Pacific railroad, U.S. Highway 30, cultivated farmland, and urban areas.

The primary past and present activities affecting greater sage-grouse in the CEA include habitat alteration associated with livestock grazing; invasion of non-native plant species such as cheatgrass; wildfires; and anthropogenic structures in sagebrush habitat, including roads, fences, and power lines.

BLM and USFS sensitive species have been affected by habitat fragmentation and habitat disturbance throughout the CEA. Within the CEA, quantified past and present disturbances to wildlife habitats based on the GAP landcover data (USGS 2001) have resulted from agriculture (cropland and pasture; 33,097 acres); roads, buildings, and other development (4,777 acres); timber harvests (2,504 acres); and quarries, mines, gravel pits, and oil wells (1,348 acres) (**Table 5.6-1**). A different dataset for mining activity in the CEA indicates that approximately 9,943 acres have been disturbed by mining (primarily from historical phosphate mining activity shown in **Figure 5.1-1** (Causey and Moyle 2001). There are an additional 6,775 acres of agency-approved mining disturbance in the wildlife CEA (**Table 5.1-2**) for a total of 16,718 acres of historical and present phosphate mine disturbance in the CEA. However, much of this area has been reclaimed and supports grassland and shrubland wildlife habitat.

Wildfires have also disturbed more than 3,800 acres of wildlife habitat in the CEA since 1980 (WFDSS 2013). Range allotments, which have affected vegetation through grazing, occur on more than 91,000 acres (16 percent) of the CEA, although the exact extent to which grazing has altered wildlife habitat (including greater sage-grouse habitat) cannot be quantified.

Additional unquantified past and present activities in the CEA that may affect special status species include residential and commercial development; vegetation management activities on private lands; roads; power lines; and recreational uses such as hunting, fishing, ATV and snowmobile use, camping, and picnicking.

5.8.4 Foreseeable Future Activities

Specific future impacts on private lands in the CEA are difficult to quantify as a result of lack of data, but would be an area smaller than the private land ownership area. Past and present actions on private land within the CEA have mainly included agriculture and grazing activities. These are anticipated to continue to impact special status species, including greater sage-grouse, in the future. Limited housing development has also occurred on the large ranches within the CEA, and this is also anticipated to continue.

Phosphate mining and the Hooper Springs Transmission Line are the only quantified reasonably foreseeable disturbances in the CEA. Most phosphate mining occurs at higher elevations above the big sagebrush ecotone; therefore, most phosphate mines are not anticipated to have substantial impacts on greater sage-grouse. Also, phosphate mines generally do not involve construction of long, linear features that would create barriers to lynx movement through the linkage area. However, future phosphate mining could contribute to loss of habitat for BLM and USFS sensitive species that use forest habitats, including forest raptors such as the northern goshawk.

The future construction of the Hooper Springs Transmission Line and other power lines has the potential to impact greater sage-grouse in the CEA where these features pass through big sagebrush habitat. Several studies suggest that sage-grouse and related species instinctively avoid areas where power lines or other vertical structures are visible in order to avoid predation (Schroeder 2010). One study found that sage-grouse tend to avoid habitat located within 600 meters (1,968 feet) of power lines (Gillan et al. 2013; Braun 1998); therefore, these features may fragment otherwise suitable sage-grouse habitat.

Table 5.1-2 lists foreseeable future mining activities; the only quantified proposed activities on public land that could impact special status species habitat throughout the CEA. These quantified foreseeable future disturbances total 8,242 acres (**Table 5.1-2**). The Hooper Springs Power Line will impact an additional 112 to 188 acres in the foreseeable future (Bonneville Power Administration 2013), for a total of up to 8,430 acres of quantified reasonably foreseeable disturbance to special status species habitat.

5.8.5 Cumulative Activities

The foremost features on the landscape affecting Canada lynx movement through the linkage area include long, linear features such as the Bear River, Union Pacific railroad, and U.S. Highway 30, as well as large blocks of cultivated farmland and urban areas. These features likely affect the movements of other large special status species (gray wolf and wolverine) also.

The foremost activities affecting greater sage-grouse include habitat alteration associated with past, present, and future livestock grazing; invasion of non-native plant species such as cheatgrass; wildfires; and anthropogenic structures in sagebrush habitat, including roads, fences, and power lines. These cumulative activities also affect other sensitive species that are dependent upon big sagebrush habitats, such as Brewer's sparrow and sage sparrow.

The foremost activities affecting many forest-dependent and riparian-dependent sensitive species within the CEA have been and will continue to be habitat changes associated with development, mining, agriculture, grazing, and timber harvest; however, not all of these activities are quantifiable. In particular, the extent to which habitat changes have occurred from livestock grazing are not possible to quantify.

Based on GAP landcover data (USGS 2001), quantified past disturbance to special status species habitat totals approximately 41,726 acres or 7 percent of the CEA. A different dataset for mining activity in the CEA indicates that approximately 9,943 acres have been disturbed by historical mining (primarily from phosphate mining activity shown on **Figure 5.1-1**; Causey and Moyle 2001). There are an additional 6,775 acres of agency-approved mining disturbance in the CEA (**Table 5.1-2**) for a total of 16,718 acres of historical and present phosphate mine disturbance in the CEA. Including these acres raises the past disturbance in the CEA to 58,444 acres or 10 percent of the CEA.

The reasonably foreseeable future disturbances quantified in **Table 5.1-2**, with the addition of the Hooper Springs Power Line, total 8,430 acres. When added to the past and present disturbances, these future disturbances would increase the disturbance of lands in the CEA to about 12 percent (approximately 66,874 acres disturbed out of 563,385 total acres). Adding the potential new disturbance of the Proposed Action (419 acres) or the RCA (391400

5.8.6 Cumulative Effects

Because the area is used as linkage habitat, the primary cumulative effect of the Proposed Action or RCA on the Canada lynx would be disruption of lynx movement through the linkage area. The Proposed Action or the RCA would potentially create a barrier to movement that would add to the effects of other barriers in the CEA such as roads, railroads, agriculture, and urban development. However, neither the Proposed Action nor the RCA would involve the construction of a highway or other long, linear feature that would preclude lynx from moving through the linkage area. It is likely that lynx and other sensitive carnivores, such as gray wolves and wolverines, would navigate around the periphery of the mine during active mining. In addition, most mine features would be reclaimed, so there would be no long-term blockage of movement through the linkage area.

Cumulative effects to the greater sage-grouse and other shrubland-dependent sensitive species within the CEA include the continued loss and degradation of big sagebrush habitat through alteration of vegetation composition and structure related to livestock grazing, invasion of non-native plant species, and changes in fire cycles. Wildfires in sagebrush may result in the establishment of cheatgrass, which establishes quickly after fire and excludes native perennials, reducing habitat for sagebrush-dependent species such as the greater sage-grouse (Zouhar 2003). The Proposed Action or RCA would contribute to the long-term loss of sagebrush habitats and increase the potential for noxious weed invasion in the Study Area. However, BMPs would be implemented to minimize the potential for cumulative effects of noxious weeds (BMPs that would minimize noxious weed impacts include keeping mining disturbances to a minimum for as short a timeframe as possible, with overburden areas and pit backfill advancing in concert with the active pit; monitoring and controlling noxious weed infestations; using certified weed-free seed, mulch, and straw bales; and developing an annual noxious weed treatment plan).

Anthropogenic structures, such as roads, fences, and power lines, add to degradation of sagebrush habitat by directly removing and fragmenting contiguous blocks of sagebrush. However, the Proposed Action or RCA would only have a minor contribution to the loss and degradation of sagebrush in the CEA because the footprint of disturbance is comparatively small, most disturbed areas would be reclaimed and eventually return to shrubland, and the area that would be affected is not pristine sagebrush habitat to begin with (habitats in the Study Area are naturally patchy and already affected by livestock grazing). Under the RCA, more of the mine disturbance would occur at higher elevations and impact more forest and high-

elevation rangeland habitat. Therefore, cumulative effects on greater sage-grouse and other big sagebrush shrubland species would be greater under the Proposed Action than the RCA.

Cumulative effects to forest and riparian-dependent sensitive species within the CEA would occur from loss, fragmentation, and alteration of habitat associated with a variety of activities including agriculture, construction of roads and buildings, phosphate mining, timber harvest, and livestock grazing. Implementation of the Proposed Action or the RCA would disturb additional suitable forest and riparian habitat for special status species. Special status species may also be displaced into adjacent habitats, which could decrease survival rates of affected individuals to some degree and increase competition. Contribution to the cumulative impacts of habitat loss and displacement are expected to continue and increase in the future for the CEA and the southeastern Idaho region. The future trend would be the increasing displacement and disappearance of species from the region that require large tracts of relatively undisturbed forest and riparian habitat, such as the northern goshawk, boreal owl, and willow flycatcher. Other impacts to BLM and USFS special status species that might cause mortalities or large-scale avoidance of the region's high-activity areas include vehicle and power line collisions, increased noise, increased human activity, and degradation of water quality.

Past and present disturbances from roads and mining activities have resulted in fragmentation of special status species populations and their habitats in the CEA. Habitat fragmentation is of particular concern for special status species that are relatively immobile and unable to disperse between habitat patches (such as reptiles and amphibians). Fragmentation effects within the CEA have not been quantified by the land management agencies. Implementing the Proposed Action or RCA would result in additional fragmentation to wildlife habitat and could isolate populations of small, immobile wildlife, such as amphibians and reptiles. Habitat fragmentation effects would be lower under the RCA, which would consolidate some of the disturbance in an existing disturbed area.

Timber harvests, livestock grazing, and wildfires in the CEA are sources of habitat changes that affect forest and riparian-dependent special status species. The majority of habitat conversion from timber harvest is in the form of forest removal followed by reforestation with a short period of early seral conditions. This habitat conversion would cause mature forest-dependent special status species, such as the boreal owl, to disperse in search of new areas until the habitats once again became suitable through succession. The Proposed Action or RCA would incrementally add to disturbance of forest and riparian habitat in the CEA, and while most disturbed areas would be re-seeded, it is anticipated that upland shrubland communities would establish on reclaimed areas and that forest and riparian vegetation would not return. Of the two alternatives, the Proposed Action would have greater cumulative effects to riparian-dependent special status species (such as the willow flycatcher and Calliope hummingbird) whereas the RCA would have greater cumulative effects to forest-dependent special status species (such as the northern goshawk, great gray owl, boreal owl, and flammulated owl).

Human presence tends to disturb many species of wildlife. Special status raptors residing in the CEA are particularly sensitive to human disturbance during the nesting season. Where possible, land management agencies have used seasonal closures and nest buffers to minimize disturbance to special status species. Mine construction and operation could cause special status species such as Canada lynx, wolverine, gray wolf, and raptors, which generally prefer areas free from anthropogenic noise and activity, to avoid the area of active mining. Special status carnivores would likely shift their travel corridors to route around the edge of the mine rather than directly through the mine. If individuals did move through the mine, they could be at risk of vehicle collision during times of heavy traffic along the haul road. Under the Proposed

Action, special status raptors could be at further risk of mortality by colliding with the overhead power line. This risk would not be present under the RCA.

Other nearby phosphate mines exhibit increased concentrations of selenium and other metals in water, aquatic plants, aquatic invertebrates, and fish near the Study Area (Hamilton and Buhl 2003). Increasing concentrations of selenium in surface water and groundwater seeps and springs may lead to reduced reproductive success in the terrestrial and aquatic wildlife of the region including special status species. Selenium contamination from operating and reclaimed phosphate mines is expected to continue in the foreseeable future. New phosphate mines are likely to incorporate BMPs that limit the potential for selenium contamination of the environment, unlike past mines that were constructed without regard for selenium contamination (IDEQ 2006).

The Proposed Action is predicted to introduce measureable amounts of selenium, manganese, zinc, and nickel into surface waters fed by groundwater downgradient of the Study Area, where it could become available to special status wildlife species either by direct exposure or accumulation through the food chain. Under the Proposed Action, the direct effects of selenium exposure on special status species within the Study Area would be long-term and minor and within the CEA would be long-term and negligible. Cumulative effects from selenium and other COPCs would likely be greatest to relatively immobile species that directly depend on aquatic habitats and spend a large portion of their life cycle in the aquatic habitats downgradient of the Study Area, including the boreal toad, northern leopard frog, common garter snake, and Yellowstone cutthroat trout. The cumulative effects on aquatic habitats for the Proposed Action within the CEA would be long-term and minor.

The RCA, in comparison to the Proposed Action, would eliminate permanent external overburden piles downslope of the pit, which would virtually eliminate the release of COPCs to surface water. There would be no cumulative effects to special status species from COPC exposure in surface waters under the RCA.

Overall, the Proposed Action would have greater cumulative effects to more special status species compared with the RCA because it would impact more species that depend on wetland and riparian habitats. These species include the bald eagle, willow flycatcher, Calliope hummingbird, trumpeter swan, American white pelican, white-faced ibis, black tern, boreal toad, northern leopard frog, common garter snake, Yellowstone cutthroat trout, and northern leatherside chub. The RCA would avoid most impacts to wetland and riparian habitats and would therefore have little or no cumulative effects to these species. However, the RCA would have greater cumulative effects to forest-dependent species including the flammulated owl, great gray owl, boreal owl, and northern goshawk. When combined with other disturbances in the CEA, both alternatives would have minor cumulative effects on species that use shrubland habitats, such as the Townsend's big-eared bat, peregrine falcon, prairie falcon, Columbian sharp-tailed grouse, and loggerhead shrike, and negligible cumulative effects to large carnivores including the Canada lynx, gray wolf, and wolverine. As discussed above, the Proposed Action would have relatively greater cumulative effects to species that are specifically dependent on big sagebrush, such as the greater sage-grouse, Brewer's sparrow, and sage sparrow.

Under the Proposed Action, reduction of impacts to TES habitat would include compensatory mitigation for impacts to wetlands under the CWA as well as voluntary mitigation for impacts quantified under the HEA. The CWA provides for compensatory mitigation for disturbances to wetlands. This mitigation typically dictates that disturbed wetlands are returned to pre-disturbance condition and/or replaced. Disturbances to upland (non-wetland) wildlife habitat

within the Study Area have been quantified through the HEA process. Mitigation for upland wildlife habitat disturbances identified through the HEA analysis is not compulsory. Agrium has volunteered to mitigate some or all of these impacts identified in the HEA analysis. Agrium would mitigate the upland wildlife habitat through funding of project(s) that will improve wildlife habitat beyond its baseline condition. COPC impacts to surface water, and the associated TES habitat impacts, would not be mitigated in the Proposed Action.

Due to the small size of wetlands impact, the RCA may or may not require compensatory mitigation under the CWA. The type of mitigation for the impacts would be determined in consultation with the USACE. This mitigation typically dictates that disturbed wetlands are returned to pre-disturbance condition and/or replaced. Disturbances to upland (non-wetland) wildlife habitat within the Study Area have been quantified through the HEA process. Mitigation for upland wildlife habitat disturbances identified through the HEA analysis is not compulsory. Agrium has volunteered to mitigate some or all of these impacts identified in the HEA analysis. Agrium would mitigate the upland wildlife habitat through funding of project(s) that would improve wildlife habitat beyond its baseline condition. Impacts to surface water and the associated TES habitat have been mitigated in development of the RCA by the elimination of the external overburden piles that were the source of impact under the Proposed Action. Removal of these piles has resulted in fully mitigating this impact.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no cumulative effects to TES species.

5.9 VISUAL RESOURCES

5.9.1 CEA Boundary

Cumulative effects were analyzed in the areas affected by past, present, and reasonably foreseeable future development activities. The CEA for visual resources is roughly equivalent to the CEA for geology, minerals, and paleontology (**Figure 5.1-1**). It encompasses a topographically discrete cluster of anticlines and synclines in the upper Blackfoot River and Bear Lake watersheds. This area comprises the majority of the Southeast Idaho Phosphate District, including KPLAs in Bear Lake and Caribou Counties.

The CEA includes sensitive viewpoints from which the Proposed Action or the RCA, and other past, present, and foreseeable disturbances would potentially be observed. Sensitive viewpoints include public roads, recreation areas, and residential areas. Visual resources would not be affected beyond the CEA because of the topographic features and forested area that restrict line of sight of the KPLA.

5.9.2 Introduction

The CEA is within a region of generally north- to northwest-trending mountain ranges and broad valleys. The area is generally undeveloped other than for mining; however, man-made features that have resulted in visual modifications to the landscape include mining and exploration activities, oil and gas activities, roads, power lines, pipelines, range improvements, and rural residences. Although scenic variety exists in the densities, arrangements, and colors of vegetation, the landscapes are typical of those found in the CEA.

Cumulative effects to visual resources from other planned or foreseeable development activities near the Study Area would result from historical, existing, and future phosphate mining in the

Rasmussen Valley area. Often, phosphate mining does not result in major impacts to visual resources because the disturbance areas are not be readily visible to the general public. Most of the past, present, and foreseeable future phosphate mining activities in the KPLA are located within relatively remote areas, and are not readily visible from sensitive viewing areas, such as roads, recreation sites, or rural residences.

5.9.3 Past and Present Activities

Past and present developments in the CEA are primarily from rural land uses and management activities on USFS and BLM lands. The CEA is generally undeveloped other than for mining; visual modifications to the federal lands in the area have been in the form of timber cuts, roads, mining operations, range improvements, fence lines, power lines, recreation sites (campgrounds), and pipelines. Other visible modifications to the existing characteristic landscape on private lands include road construction, vegetation management and fuels treatments, power line and utility corridors (water and gas lines), communication sites, campgrounds, day use facilities, trailheads, hiking trails, fuel wood gathering, agricultural use, and private residences. Current management and private activities, which are taking place at the present time, are a continuation of existing uses.

Most of the land surface in the CEA, including the majority of the previously approved and existing mine areas, is federal land managed for the visual objectives for the USFS Visual Quality Objective (VQO) Modification and the BLM Visual Resource Management (VRM) Class III. BLM lands constitute a relatively small portion of the land within the CEA. Areas designated as VQO Modification or VRM Class III areas allow for considerable modification of the characteristic landscapes and typically are compatible with phosphate mining activities. With mitigation, mining activities can generally meet the VQOs for VQO Modification and VRM Class III areas.

5.9.4 Foreseeable Future Activities

Reasonably foreseeable disturbances (including the Proposed Action or the RCA) expected from agency-approved phosphate mining in the CEA are summarized in **Table 5.1-2** and shown on **Figure 5.1-1**. Development of approved areas would result in effects to visual resources similar to past and present disturbances, but would include a larger area of affected landscape. Foreseeable future effects to the visual resources of the CEA are also likely to occur as a result of non-mining activities on public land administered by the USFS and BLM and recreational lands within the Blackfoot River WMA, including roads, power lines, pipelines, timber cuts, range improvements, and development of recreation sites (campgrounds). There would also be cumulative effects to visual resources from other types of planned or foreseeable activities, including development of rural residences or various other improvements on private lands. These types of activities would likely occur as a consequence of population and economic growth in the CEA, which would result in a proportionate increase in the public use of federal lands.

5.9.5 Cumulative Activities

A total of 17,391 acres of phosphate mining-related surface disturbance have been recognized for the Southeast Idaho Phosphate District (**Table 5.1-1**). The CEA includes four active phosphate mines (Blackfoot Bridge, Rasmussen Ridge Mines, Lanes Creek Mine, and Smoky Canyon) and 23 previously approved phosphate mines.

The potential new disturbance from the Proposed Action (440 acres) or the RCA (400 acres) would increase the total phosphate mining-related surface disturbance within the CEA by approximately 1.1 to 1.2 percent. The new mining activities would comply with the objectives of the USFS VQOs and the BLM VRMs.

5.9.6 Cumulative Effects

Under the Proposed Action or the RCA, phosphate mining activities would contribute to the cumulative visual effects associated with previously approved and existing phosphate mines in the CEA. These visual effects include roads, pit walls, landform changes from mining, and noticeable vegetation transition from native habitats. Under implementation of the Proposed Action or the RCA, effects to scenic quality would occur over a larger area as a result of additional industrial components and activities. The Proposed Action would extend the duration of visible mining-related disturbance in the CEA for an additional 5.8 years relative to the existing Rasmussen Ridge Mines. The RCA would extend the duration of visible mining-related disturbance an additional 7.1 years. It is likely that reclamation activities would occur at active mines throughout the CEA during the active mine life of the Rasmussen Valley Mine; therefore, there would be little or no net increase in the visibility of mining components and activities despite an increase in total surface disturbance within the CEA.

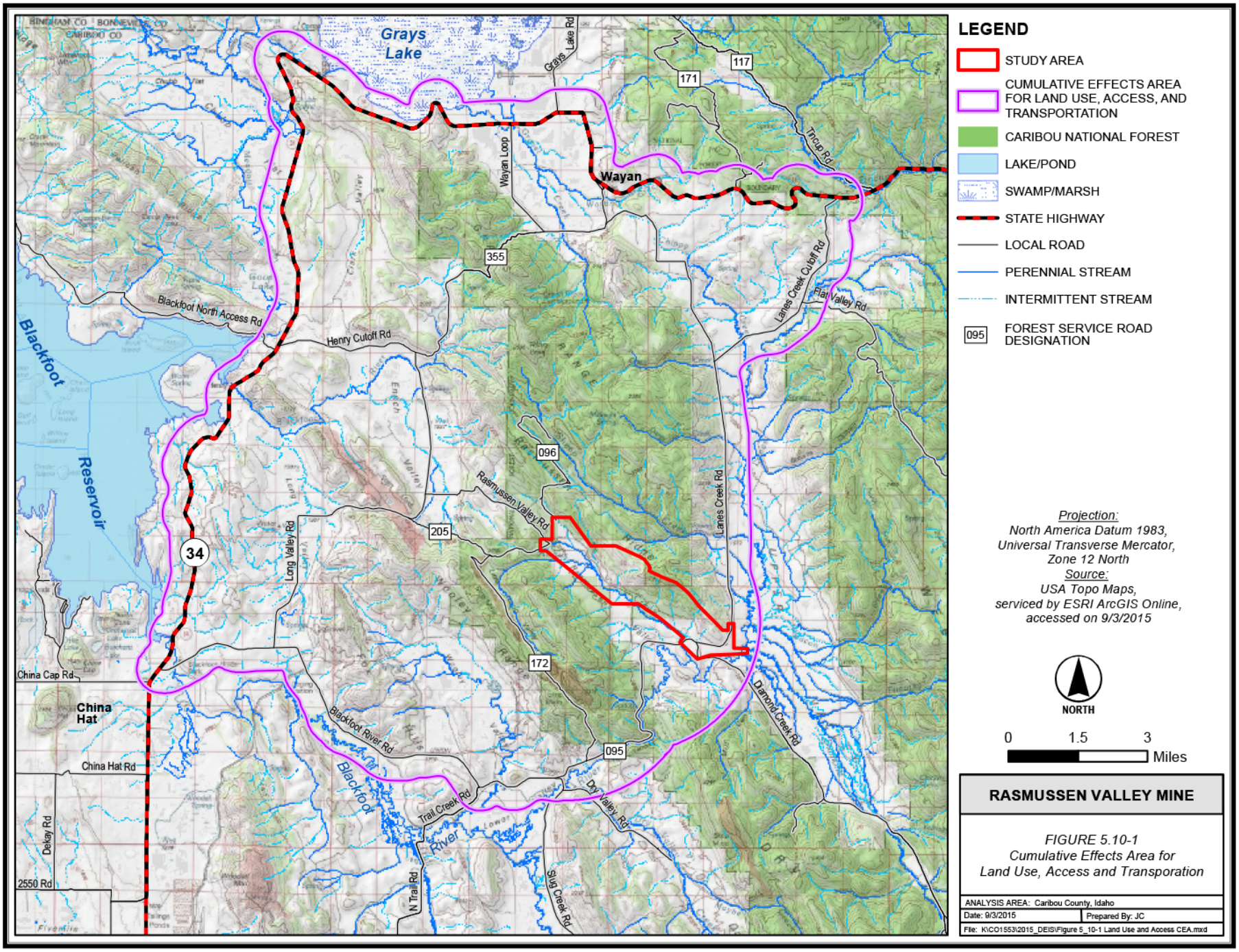
Future mining projects would likely impose the same types of adverse visual impacts as those described for the Proposed Action or the RCA. Economic and population growth would increase recreational uses of public lands in the CEA and would also increase the number of residents and recreationists who have a concern for scenic resources. An increase in viewers and increased phosphate mining disturbance in the CEA would increase opportunities for the public and local residents to view phosphate mining facilities and activities, including the Proposed Action or the RCA, from sensitive viewing areas. Under the Proposed Action or the RCA, the 1.2-percent increase in surface disturbance would result in a long-term and negligible increase in the extent of the visibility of phosphate mining components within the analysis area.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no cumulative effects to visual resources.

5.10 LAND USE, ACCESS, AND TRANSPORTATION

5.10.1 CEA Boundary

The analysis areas for transportation and access and for recreation are linked to the roads that provide access to the Study Area. The analysis area for transportation and access includes all areas where access to lands could be impacted by the Proposed Action or the RCA at the Rasmussen Valley Mine. Effects to transportation, access, and recreation can be more than the impacts related to maintenance or closure of roads and can include increased mine-related traffic that impedes access, increased need for road maintenance, or increased traffic noise that degrades the quality of recreation areas. The CEA for transportation and access includes those portions of Lanes Creek County Road and Blackfoot River Road from State Highway 34 near Wayan to the north to State Highway 34 near China Cap to the west and all minor roads branching from these (**Figure 5.10-1**). The CEA for recreation is all public lands in eastern Caribou County, but primarily those recreation opportunities that are accessed by the same roads that provide access to the Study Area.


Grays Lake
Grays Lake Rd
171
117
Wayan
Wayan Loop
Targhee Rd
355
Blackfoot North Access Rd
Henry Cutoff Rd
Lanes Creek Cutoff Rd
Flat Valley Rd
Blackfoot Reservoir
096
Rasmussen Valley Rd
Lanes Creek Rd
205
34
Long Valley Rd
172
China Cap Rd
China Hat
Blackfoot River Rd
Diamond Creek Rd
095
China Hat Rd
Trail Creek Rd
Dry Valley Rd
Blackfoot River
Dekay Rd
2550 Rd
N Trail Rd
Slug Creek Rd
LEGEND
STUDY AREA
CUMULATIVE EFFECTS AREA FOR LAND USE, ACCESS, AND TRANSPORTATION
CARIBOU NATIONAL FOREST
LAKE/POND
SWAMP/MARSH
STATE HIGHWAY
LOCAL ROAD
PERENNIAL STREAM
INTERMITTENT STREAM
095
FOREST SERVICE ROAD DESIGNATION
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
USA Topo Maps,
serviced by ESRI ArcGIS Online,
accessed on 9/3/2015
NORTH
0
1.5
3
Miles
RASMUSSEN VALLEY MINE
FIGURE 5.10-1
Cumulative Effects Area for
Land Use, Access and Transporation
ANALYSIS AREA: Caribou County, Idaho
Date: 9/3/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Figure 5_10-1 Land Use and Access CEA.mxd

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The analysis area for grazing includes all grazing directly under the influence of the Rasmussen Valley Mine and potentially other allotments if grazing is displaced. The CEA for grazing includes the Rasmussen Valley Cattle Allotment (RVCA) that extends across large portions of the Study Area and the adjacent Henry Olsen Sheep and Goat Allotment (HOSGA) to the northeast.

5.10.2 Introduction

Impacts to uses of the land, including grazing, recreation, and access and transportation, are innately tied to a given location, and except in the cases of physically overlapping activities, do not present site-specific cumulative effects.

Impacts to land use and access in the CEA consist of loss of resources or loss of access to resources. Loss of a resource can be total because of destruction of the resource by mining, or partial because of alteration of the resource or its distribution because of changes in vegetation, drainage, or the locations of roads. Mining in the CEA is expected to be a finite activity that would be followed by reclamation; impacts to the use of lands would be temporary, with the majority of impacted lands returning to a pre-disturbance condition in the long term.

Cumulative effects to grazing in the CEA occur primarily from mining and, to a lesser extent, from timber harvesting. In general, grazing is not allowed on active mine areas, livestock trailing is limited, and no watering is allowed in water control ponds or water flowing from mine overburden seeps. Depending on the reclamation methods, renewed grazing may not be allowed on a reclaimed mine site for several years after closure.

The principal recreation activity in the Study Area is hunting, primarily big game hunting, and to a lesser extent, upland game birds. Cumulative effects to hunting occur from alteration of the habitat by mining or timber harvesting and from interruption of migration routes by new roads. Other land uses in the general area of the CEA are mining and timber harvesting. The operation of this mine would dominate the land use during its operation and displace the opportunity for future mining because of the redistribution of mined minerals and overburden. The cumulative effect to timber harvesting would depend on the extent to which re-establishment of forest is inhibited by reclamation methods.

Cumulative effects to access and transportation would be influenced by the roads built and maintained for mining and those that are left in place after closure and reclamation. During mining and reclamation, these roads may be closed to public access, but some may be opened by surface owners or government agencies over time.

5.10.3 Past and Present Activities

The past and present activities in the vicinity of the Proposed Action or the RCA that could potentially have a cumulative effect are those described in Section 3.10. These activities, including grazing, recreation, phosphate mining, and the construction and use of roads and trails in the area, have shaped the land use seen in the CEA today.

5.10.4 Foreseeable Future Activities

The majority of foreseeable future activities as discussed above, like the Proposed Action or the RCA, would be continuations of activities that are currently taking place in the CEA, but would be in new locations. Of these foreseeable future activities, only the Lanes Creek Mine is located

wholly or in large part within the CEA. The very northern portion of the Husky 1 North Dry Ridge Mine may extend into the very southeastern portion of the CEA. It is presumed that usable public and private land in the CEA would continue to be grazed. This also represents a continuation of current activities in the CEA.

5.10.5 Cumulative Activities

Cumulative activities include all activities currently being conducted in the CEA, all activities conducted in the recent past whose effects may still be realized, and all foreseeable future activities as described above.

5.10.6 Cumulative Effects

Cumulative effects on the pattern of land use within the CEA (including grazing, recreation, and means of access) have occurred and would occur from past, present, and reasonably foreseeable future development activities. The cumulative effects that could occur would be the result of activities that are currently taking place in the CEA, but would be in new locations. As a result of the sequential nature of phosphate mining in the region, each new mine represents a continuation of existing mining activities and a continuation of existing effects.

Cumulative effects on transportation in the CEA may or may not be realized depending on the timing of the opening of future mines located wholly or in part in the CEA. If the Proposed Action or the RCA and the Lanes Creek Mine are in operation at the same time, traffic on roads in the CEA may increase. However, given that Lanes Creek Mine ore would be transported only during the winter and/or night all year long (thus limiting the period where ore transport activities could overlap), and given the rural nature of the area and few residents, any increase in traffic would be a cumulatively short-term and minor effect.

Cumulative effects to the amount of land available for grazing could be realized within the CEA as lands affected by the Proposed Action or the RCA may not be reclaimed and made usable again for grazing before the start of future mining projects in the CEA. These effects would be long-term and minor given the small footprint of reasonably foreseeable projects in the CEA and the ongoing reclamation of past projects in the CEA.

Similarly, cumulative effects to the amount of land available for recreation could be realized within the CEA, as lands affected by the Proposed Action or the RCA may not be reclaimed and made available again for recreation before the start of future mining projects in the CEA. These effects would be long-term and negligible given the small footprint of the single reasonably foreseeable project located on public land in the CEA and the ongoing reclamation of past projects in the CEA.

In summary, the Proposed Action or the RCA, in addition to other existing and reasonably foreseeable projects in the CEA, would result in a continuation of existing land use- and traffic-related effects, often in new locations. These effects would be long-term and minor.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no effects to land use, access, or transportation.

5.11 CULTURAL RESOURCES

5.11.1 CEA Boundary

Private and public lands within and near the Proposed Action have been assessed for the presence of historic properties that could be affected. The CEA for cultural resources includes that area affected by past, present, and reasonably foreseeable future development activities within the Survey Area and a 1-mile radius around it. A 1-mile radius is a conventional buffer to provide a more complete context for cultural resource sites in the vicinity. Cumulative effects are addressed in terms of adverse effect to historic properties within the Survey Area added to those in adjacent areas of the CEA.

5.11.2 Introduction

Twenty-nine previous cultural resource investigations that have included portions of the cultural resources CEA have reported 26 cultural resource sites and 13 isolated finds within the CEA. These are summarized in **Section 3.11.3**. All of these resources have been evaluated as not eligible for the National Register of Historic Places (NRHP). Therefore, there are no known historic properties in the CEA (Späth 2012).

5.11.3 Past and Present Activities

There are known past and present ground disturbances in the CEA, including portions of the existing South Rasmussen Mine to the north and the recently reopened Lanes Creek Mine to the east, that have potentially affected historic properties. Within the general area, there are other past and present phosphate mines, including the Wooley Valley Mine to the west, and Rasmussen Ridge Mines and nearby Enoch Valley Mine to the north, that may also have affected cultural resources. However, no adverse effects to historic properties have been documented. The areas that have been extensively disturbed are primarily located on rugged hillsides that are unattractive for sustained historic or prehistoric occupation and are marginal for ranching. The areas also do not hold precious metal deposits that could have attracted early metal mining. Historic and prehistoric sites in the region, including emigrant trails, occur along the river valleys and in lower, more open terrain with access to reliable sources of water. Historic disturbances have been more extensive to the south along natural travel corridors, through Soda Springs, and to the north in the Caribou Mountains area associated with periodic mining booms from the 1860s to 1920.

5.11.4 Foreseeable Future Activities

Reasonably foreseeable future disturbances in the Study Area are the Proposed Action or the RCA associated activities. There are undeveloped phosphate leases to the south at North Dry Ridge and others east of Diamond Creek. There are plans for developing the Husky 1 lease which may be associated with activities at North Dry Ridge. There are no proposed or anticipated changes in recreational activities in the area or any expectation of residential developments that would affect historic properties.

5.11.5 Cumulative Activities

Past, present, and reasonably foreseeable disturbance to cultural resources in the Study Area have been and would be associated with mining. There has been no known disturbance to

historic properties. The Proposed Action or the RCA, if developed to the maximum extent of disturbance, would not affect any historic properties and would not contribute cumulatively to adverse effects to historic properties. If any undocumented historic properties are discovered during development, operation, or reclamation of the mine, these resources would be avoided and protected. If the site cannot be avoided and protected, a treatment plan would be developed in consultation with CTNF and the State Historic Preservation Office (SHPO) to mitigate adverse impacts to the site.

5.11.6 Cumulative Effects

Section 106 of the National Historic Preservation Act (NHPA) requires consideration of the effects of federal actions to historic properties. No historic properties have been identified within the CEA of the Proposed Action or the RCA. Neither the Proposed Action nor the RCA would have adverse effects to historic properties. Therefore, neither the Proposed Action nor the RCA would contribute to cumulative impacts to historic properties in combination with past, present, and reasonably foreseeable future activities in the CEA.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no cumulative effects to cultural or historic properties in the Study Area.

5.12 TRIBAL TREATY RIGHTS AND INTERESTS

5.12.1 CEA Boundary

The Tribes retain and exercise treaty rights on unoccupied public lands. Private and public lands within the cultural resource Survey Area were assessed for traditional Tribal interests.

The CEA for Tribal treaty rights and interests includes that portion of the Southeast Idaho Phosphate District on public lands in Caribou and Bear Lake Counties. These areas are almost entirely within the upper Blackfoot River and upper Bear River drainage basins. The area extends into a small portion of the Salt River drainage near the Wyoming state line. This CEA does not include all areas of Tribal treaty rights and interests in southeast Idaho, but only those areas that have been or may be affected by past, present, or reasonably foreseeable future phosphate mining and associated activities. To the extent that data are available on effects to Tribal treaty rights and interests, the past, present, and reasonably foreseeable future actions would include those identified by the Agencies from the expansion of phosphate mining in the 1970s to currently planned and validated future activities. In general, documentation of effects to Native American interests and concerns has been more consistent and complete since the passage of the Native American Graves Protection and Repatriation Act (NAGPRA) in 1990, and much of the earlier information may not be comparable.

5.12.2 Introduction

Federal land managers have a responsibility to consider effects on resources essential for the Tribes to exercise their treaty rights on public lands and a responsibility to manage and maintain the habitat of traditionally utilized natural resources in a viable and sustainable condition. Over the years, the ability of the Tribes to practice their traditional culture on these lands has been reduced by loss of unoccupied lands through loss or conversion of vegetation and wildlife habitat from phosphate mining and degradation of the resources valued by the Tribes. The Study Area includes a relatively small area of unoccupied public land in comparison to the

extent of National Forests and BLM lands in the region. Nevertheless, the incremental loss of lands constitutes a cumulative impact.

5.12.3 Past and Present Activities

Past and present impacts to traditional resources include access restrictions and land disposals or exchanges that have reduced the availability of unoccupied lands for exercising Tribal treaty rights. Fire suppression, mining, grazing, and timber harvest have altered or restricted access to areas of unoccupied public lands, have changed the vegetation, and in some areas, have affected water quality. In southeast Idaho, past mining alone has disturbed approximately 17,875 acres since 1947. A large portion of these lands has been revegetated by reclamation activities. However, habitats have been altered or otherwise changed, affecting Tribal hunting and gathering activities. The full impact to natural resources utilized by Indian Tribes is not known at this time.

5.12.4 Foreseeable Future Activities

Reasonably foreseeable future disturbances in the CEA would result from the Proposed Action or the RCA and associated activities. Mining plans currently being processed could result in more than 5,800 acres of additional disturbance in southeast Idaho. During mining, many traditional natural resources would be destroyed, and access to others would be impeded by the mine. Mining would continue until the approved ore reserves are depleted, and reclamation of the mined areas would take many years. Unique or non-renewable traditional resources have not been identified in the Study Area. The mined areas would be reclaimed, and there would not be a permanent loss of access to resources and the ability to exercise treaty rights.

5.12.5 Cumulative Activities

In recent years, the cumulative impacts to natural resources on unoccupied federal lands have slowed, and more coordinated efforts have been directed to reclamation and restoration of the resources. Federal and state agencies are enhancing native fish and wildlife habitat, and these collective efforts to improve the condition of natural resources contribute to the protection and restoration of Tribal treaty rights. Appropriate mitigation measures and environmental protection measures (such as reclamation, stormwater and sediment control, groundwater and surface water sampling/monitoring), which are protective of natural resources, are required and implemented for ongoing and future mining projects. These would continue.

5.12.6 Cumulative Effects

There are currently no generally accepted measures to address the temporary and long-term loss of the exercise of Tribal treaty rights. The inability to exercise treaty rights is important to the Shoshone and Bannock Tribes and potentially affects all Tribal members. Consultation is ongoing among the Tribes and federal land managing agencies to address the most effective ways to protect and restore traditional resources and assure the continued exercise of Tribal treaty rights.

The EIS can generally assign a quantification (context, duration, and intensity), as required by CEQ, to the impacts to resources such as wildlife or water quality. However, it is difficult to quantify the impact of a temporary loss of a right. Consultation that has occurred to date with the Shoshone and Bannock Tribes is described in **Section 1.6.2**. During consultations for this EIS,

the Shoshone and Bannock Tribes stated that any loss of Tribal treaty rights is significant to them and could potentially affect all Tribal members.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no cumulative effects on traditional resources in the Study Area.

5.13 SOCIAL AND ECONOMIC CONDITIONS

5.13.1 CEA Boundary

The CEA for social and economic conditions encompasses Caribou, Bear Lake, and Bannock Counties in Idaho, and Lincoln County (Star Valley area) in Wyoming (**Figure 5.13-1**). The two phosphate processing facilities (P4 Monsanto Plant and Agrium Conda Phosphate Operations) and the majority of the phosphate mines in the Southeast Idaho Phosphate District are in Caribou and Bear Lake Counties, Idaho. Because of the concentration of activity and employment in Caribou County, cumulative effects would be most strongly realized in Caribou County, with lesser effects felt in Bear Lake, Bannock, and Lincoln Counties.

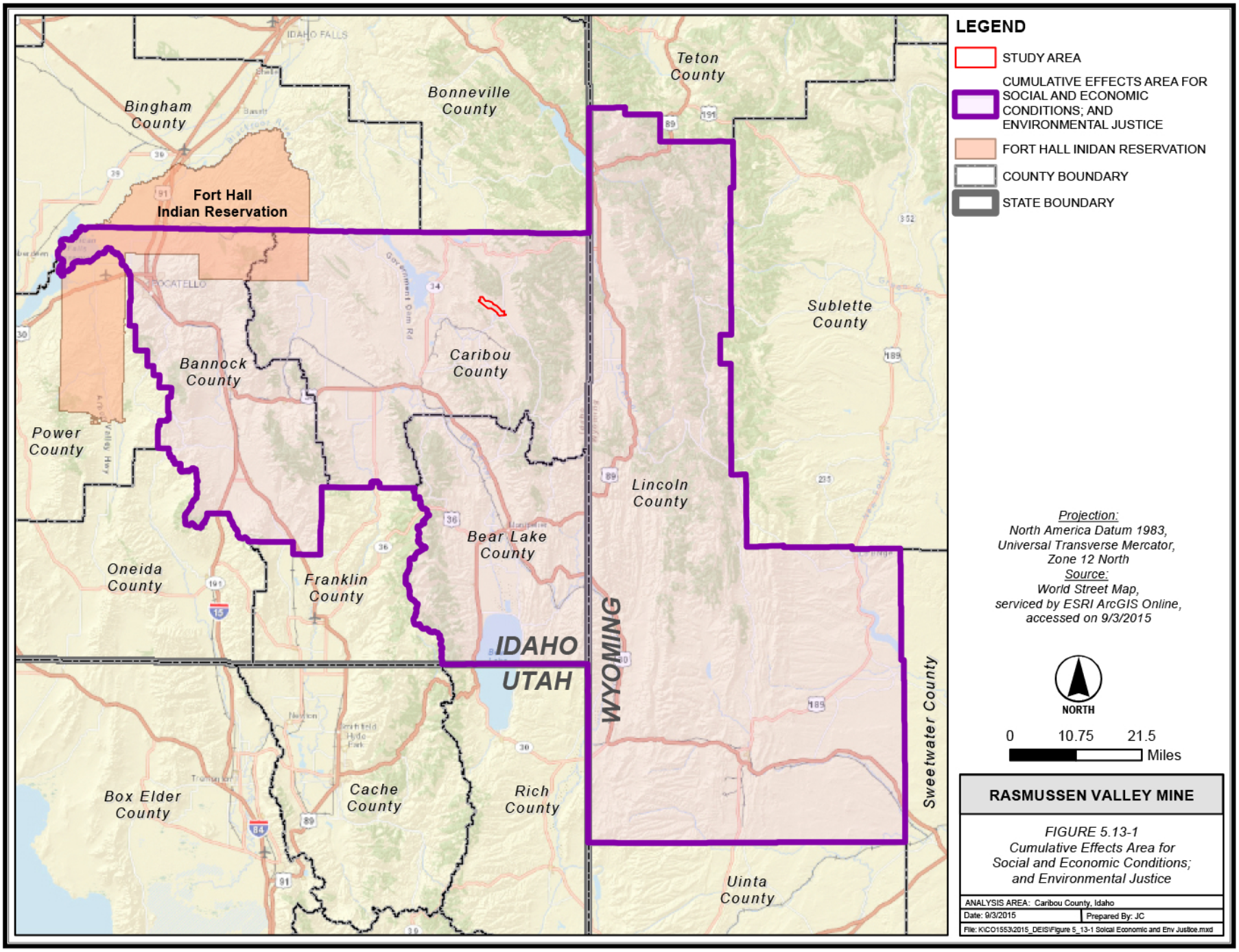
5.13.2 Introduction

The types of cumulative effects that could occur to social and economic conditions in the CEA would primarily be from a loss of economic activity under the No Action Alternative. Because the Proposed Action or the RCA constitute continuation of activities that are currently taking place in the CEA, but would be in new locations, it is not anticipated that there would be any increases in the populations of the CEA counties as a result of the Proposed Action or the RCA; therefore, there would be no additive, cumulative effect to housing, community services, and infrastructure from the Proposed Action or the RCA.

Local economic activity has increased and diversified in recent years, and such diversification may continue into the future. However, phosphate mining and ore processing will likely continue to anchor the economies of Caribou and Lincoln Counties.

5.13.3 Past and Present Activities

The contribution of past and present phosphate mining and related processing plants to local economies within the CEA has been major in terms of employment and revenues earned from tax collections, purchasing, and value-added phosphorus products. The active phosphate mines, as well as previously approved mines, are part of the economic base of the CEA that stimulates the growth of other economic sectors through a multiplier effect as described in **Chapter 4**. Contributions to local economies from increased employment and addition of workforce payroll to local economies have benefitted Bannock and Lincoln Counties; however, no phosphate mines are located in these counties. Therefore, revenues earned from tax collections and equipment purchases have occurred primarily in Caribou and Bear Lake Counties.


LEGEND
STUDY AREA
CUMULATIVE EFFECTS AREA FOR SOCIAL AND ECONOMIC CONDITIONS; AND ENVIRONMENTAL JUSTICE
FORT HALL INIDAN RESERVATION
COUNTY BOUNDARY
STATE BOUNDARY
Bingham County
Bonneville County
Teton County
Fort Hall Indian Reservation
Sublette County
Caribou County
Bannock County
Power County
Lincoln County
Bear Lake County
Oneida County
Franklin County
IDAHO
UTAH
WYOMING
Sweetwater County
Box Elder County
Cache County
Rich County
Uinta County
Projection:
North America Datum 1983,
Universal Transverse Mercator,
Zone 12 North
Source:
World Street Map,
serviced by ESRI ArcGIS Online,
accessed on 9/3/2015
NORTH
0 10.75 21.5
Miles
RASMUSSEN VALLEY MINE
FIGURE 5.13-1
Cumulative Effects Area for
Social and Economic Conditions;
and Environmental Justice
ANALYSIS AREA: Caribou County, Idaho
Date: 9/3/2015
Prepared By: JC
File: K\CO1553\2015_DEIS\Figure 5_13-1 Solcal Economic and Env Justice.mxd

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5.13.4 Foreseeable Future Activities

The majority of foreseeable future activities as discussed above, like the Proposed Action or the RCA, would be continuations of activities that are currently taking place in the CEA, but would be in new locations. The only identified non-phosphate mining-related foreseeable future activity (a proposed power line) would be short-term in nature, and would have no long-term socioeconomic impact in the CEA.

5.13.5 Cumulative Activities

Cumulative activities include all activities currently being conducted in the CEA, all activities conducted in the recent past whose effects may still be realized, and all foreseeable future activities as described above.

5.13.6 Cumulative Effects

Cumulative effects on the social and economic structure within the CEA have occurred and would occur from past, present, and reasonably foreseeable development activities. These effects have occurred primarily in Caribou County in terms of tax revenues and purchases of equipment and other services; however, all CEA counties have and may continue to benefit from employment. The cumulative effects (both negative and positive) have been substantial and have the potential to continue.

The Proposed Action or the RCA, in addition to other existing and reasonably foreseeable phosphate mining projects, would prolong the economic benefits associated with phosphate mining and ore processing as described in **Chapter 4**. There is a trend to the development of low-density residential areas, sometimes on privately owned agricultural lands. This has a cumulative effect on the lands outside population centers. However, this land use change is not related to the Proposed Action or the RCA. It is not anticipated that there would be any increases in the populations of the CEA counties as a result of the Proposed Action or the RCA; therefore, there would be no additive, cumulative effect to housing, community services, and infrastructure from the Proposed Action or the RCA. The cumulative effects on social and economic conditions would be positive, short-term and major.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no economic benefit from extending mining operation from the Rasmussen Ridge Mines to the Rasmussen Valley Mine. Overall impacts of the No Action Alternative to social and economic conditions would be adverse, long-term and major.

5.14 ENVIRONMENTAL JUSTICE

5.14.1 CEA Boundary

The analysis area for the potential health risks of the Proposed Action or the RCA for minority and low-income populations would be limited to the mining-influenced area in the vicinity of the Rasmussen Valley Mine. The analysis area for disproportionate social and economic effects will be based on the U.S. Census (USCB) Block Group that contains the mine area. The smallest census unit for which both ethnic and poverty data are available is the Block Group. Therefore, the Block Group is the basic geographic unit of comparison for social and economic factors considered in environmental justice. Census data from the Block Group are compared to

equivalent quantitative data for Caribou County to assess whether there are concentrations of minority or low-income populations in the Block Group relative to the county. This analysis is based on impacts to minority and low-income populations compared to the No Action Alternative.

The CEA for environmental justice encompasses Caribou, Bear Lake, and Bannock Counties in Idaho, and Lincoln County (Star Valley area) in Wyoming (**Figure 5.13-1**). Most of the phosphate mines and processing facilities in the Southeast Idaho Phosphate District, including KPLAs, are in Caribou County, Idaho, with one mine in Bear Lake County; however, employees are located within the four-county area.

5.14.2 Introduction

The types of effects that could occur to minority and low-income populations in the CEA would primarily be from potential adverse environmental impacts of phosphate and other mineral resource exploration and development.

5.14.3 Past and Present Activities

As presented in **Section 4.14**, there are no communities in the vicinity of the Rasmussen Valley Mine that are minority as a whole or that are low-income as a whole. Therefore, none have been exposed to high and adverse environmental impacts as a result of the Proposed Action.

5.14.4 Foreseeable Future Activities

As presented in **Section 4.14**, there are no communities in the vicinity of the Rasmussen Valley Mine that are minority as a whole or that are low-income as a whole. Therefore, none would be exposed to high and adverse environmental impacts as a result of foreseeable future actions.

5.14.5 Cumulative Activities

As presented in **Section 4.14**, there are no communities in the vicinity of the Proposed Action that are minority as a whole or that are low-income as a whole. Therefore, none have been, are, or would be exposed to high and adverse environmental impacts as a result of cumulative activities.

5.14.6 Cumulative Effects

As presented in **Section 4.14**, there are no communities in the vicinity of the Rasmussen Valley Mine that are minority as a whole or that are low-income as a whole. Therefore, none would be exposed to high and adverse environmental impacts as a result of implementation of the Proposed Action or the RCA. Therefore, the Proposed Action or the RCA would not contribute to any potential cumulative effect on these populations.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and there would be no cumulative effects to minority populations in the area.

5.15 HAZARDOUS MATERIALS AND SOLID WASTE

5.15.1 CEA Boundary

The analysis area for the Proposed Action and alternatives includes the Study Area and those potentially affected areas downstream/downgradient of the project. The CEA for cumulative effects associated with hazardous and solid waste is the Southeast Idaho Phosphate District, including KPLAs, in Bear Lake and Caribou Counties, Idaho. Caribou and Bear Lake Counties contain most of the southeastern Idaho phosphate mines and processing facilities.

5.15.2 Introduction

Cumulative effects associated with hazardous materials and wastes from other planned or foreseeable development activities near the Study Area would result from historical, existing, and future phosphate mining in the Rasmussen Valley area. Hazardous and solid waste generated by the mine would be transported by contractors to agency-approved landfill facilities. Under the Proposed Action or RCA, the transport, storage, use, and disposal hazardous materials and wastes would be required to comply with existing local, state, and federal regulations.

5.15.3 Past and Present Activities

Phosphate mining and exploration have been ongoing in the region since 1912. Numerous active, abandoned, idled, or reclaimed phosphate mines are found in the region. Ongoing BLM-approved mining and exploration activities within the Study Area require the use of hazardous materials and result in the generation of industrial, non-hazardous solid wastes, as well as hazardous wastes. Resource Conservation and Recovery Act (RCRA) and solid waste laws and regulations apply to these wastes. However, overburden produced from mine operations is exempted from hazardous and solid waste regulations. Mining and exploration activities also typically use diesel fuel, gasoline, and lubricating grease; solvents; and other chemicals and materials. Hazardous materials and solid wastes are managed and controlled under current regulations and BMPs.

In addition to mining, major past and present land uses occurring in parts of the CEA include agriculture and residential development. Agricultural activities and residential development on private lands have also generated hazardous and solid wastes. Private landowners typically contract with private waste management specialists for waste transport and disposal.

5.15.4 Foreseeable Future Activities

Twenty-six previously approved and active phosphate mine sites are within the CEA (**Table 5.1-1**). In addition to wastes directly related to the production of phosphate rock, such as overburden (not considered a hazardous waste), mining activities in the CEA would generate other maintenance wastes that may include used petroleum products, other hazardous wastes from equipment maintenance, trash, and debris. These wastes would be recycled or hauled to appropriate landfills and other disposal sites.

5.15.5 Cumulative Activities

Past, present, and reasonably foreseeable future phosphate mining projects in the CEA require the use of hazardous materials and generation of hazardous and solid waste on federal lands. Development on private lands has also generated hazardous and solid wastes. Under the Proposed Action or the RCA, hazardous materials would continue to be used and wastes generated at rates similar to those at the existing Rasmussen Ridge Mines. Management practices for hazardous materials and wastes would continue in the same manner as currently implemented at Rasmussen Ridge Mines.

Under the Proposed Action or the RCA, the primary routes for transporting hazardous materials from Soda Springs to the Study Area are State Highway 34, Blackfoot River Road, and Rasmussen Valley Road. These are the same transport routes as those used by the existing Rasmussen Ridge Mines.

5.15.6 Cumulative Effects

Any past chemical or petroleum spills have been managed. Present and reasonably foreseeable future activities carry the potential for chemical and petroleum spills. Under the Proposed Action or the RCA, fuels, hazardous materials, and wastes would be transported, stored, and managed in accordance with federal, state, and local regulations. An accidental spill or release of hazardous materials or wastes is unlikely to pose environmental or public health and safety risks.

Under the Proposed Action or the RCA, there would be little or no net increase in the quantities of materials used or wastes generated relative to what is currently managed at the Rasmussen Ridge Mines. The Caribou County Landfill is located in Soda Springs; however, within an eight-county district in southeastern Idaho, there are 22 landfills consisting of seven municipal landfills and 15 non-municipal landfills (Southeastern District Health Department 2009). Therefore, the disposal of solid waste from phosphate mines in southeast Idaho would not consume the capacity of any single landfill. Given the existing regulatory framework for transporters, hazardous material and waste storage facilities, and waste disposal, the Proposed Action or RCA, in combination with the other projects, storage capacity for disposal is readily available and would have negligible effects on hazardous materials and wastes generation and management.

Under the No Action Alternative, the Rasmussen Valley Mine would not be constructed, and no new materials would be used or wastes generated.